

Observations on Normal Body Temperatures in Differently Climate Conditions

MyHang Nguyen^{1*#} and Hiromi Tokura²

¹Graduate School of Human Culture, Nara Women's University, Japan

²Department of Working Physiology & Ergonomics,
Nofer Institute of Occupational Medicine, Poland

In order to know the characteristics of circadian rhythms in core temperature in tropical inhabitants, we measured rectal temperatures every 10 min for 24 hrs in 6 Vietnamese, 20 - 22 yrs (5 males and 1 females) under natural conditions. Average light intensity was 16000 lx. Ambient temperatures ranged from 33 to 36 oC. These data obtained were compared with those in Japanese settlers and the Polish inhabitants. The participants were sitting mostly during wakefulness and lying in bed during sleep. The results obtained are summarized as follows: 1) The average maximum value was 37.7 oC, which was significantly higher than in the Japanese and Polish as well. 2) The average minimum value was 36.4 oC, which was also lower. 3) A range of oscillation was 1.3 oC, which was clearly greater than in the people living in the temperate areas. The higher maximum value of core temperature, which was actively regulated under warm temperature, seemed of adaptive significance in order to reduce water consumption. A greater range of oscillation in tropical Vietnamese people might have ecological significance for efficient acclimatization in the environment with strong light intensity and high ambient temperature, suggesting that the setpoint of core temperature could show a greater range of oscillation.

Key words: Body temperatures, setpoint, circadian rhythm, tropic

INTRODUCTION

Warm acclimatization in humans inhabiting different

*To whom correspondence should be addressed.

Email: zam.guen@cc.nara-wu.ac.jp

#Present address: Graduate School of Human Culture,
Nara Women's University, Japan.

Climates have been discussed by many authors. Under strong light intensity and high ambient temperature, how do the Vietnamese inhabitants have acclimatized themselves? Few researches deal with this area from the viewpoint of circadian rhythm and the subjects served were not tropical indigenous peoples. We have investigated circadian rhythm in the Vietnamese and made a comparison with the Polish and the Japanese.

MATERIALS AND METHODS

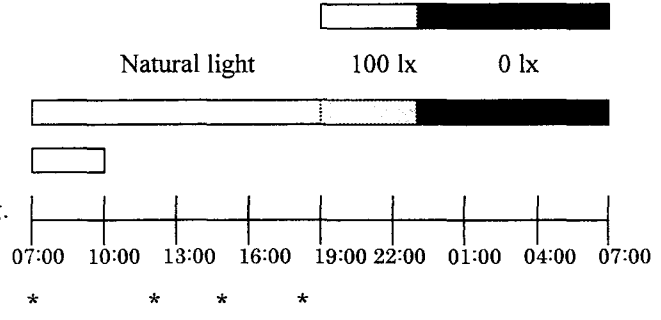
In summer, 1999: In Vietnam: measured rectal and skin temperatures in the Vietnamese residents (6 participants). Average light intensity: over 16000 lx; average T_a : 35°C. In Poland: measured rectal temperature in the Polish residents (5 participants). Average light intensity: 8000 lx; average T_a : 25°C.

In summer, 2000: In Vietnam: measured rectal and skin temperatures in the Japanese settlers (6 participants). Average light intensity: over 16000 lx; average T_a : 34.5°C.

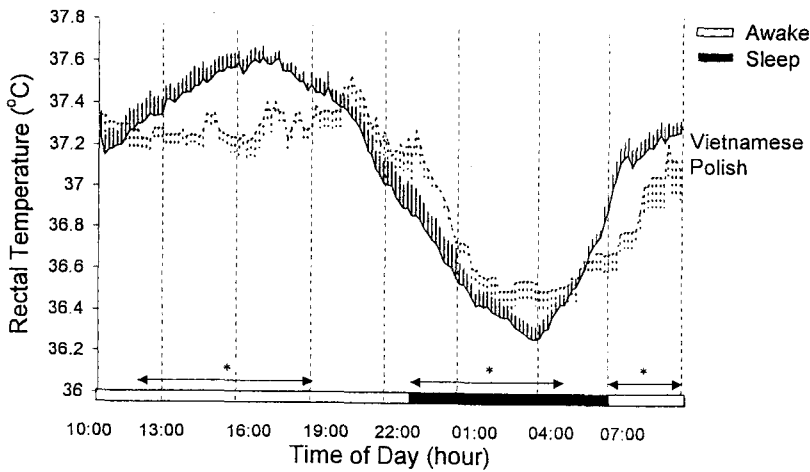
Vietnamese residents (5M, 1F): 20-22 yrs, 167 cm, 56 kg.

Polish residents (3M, 2F): 21 yrs, 175 cm, 68 kg.

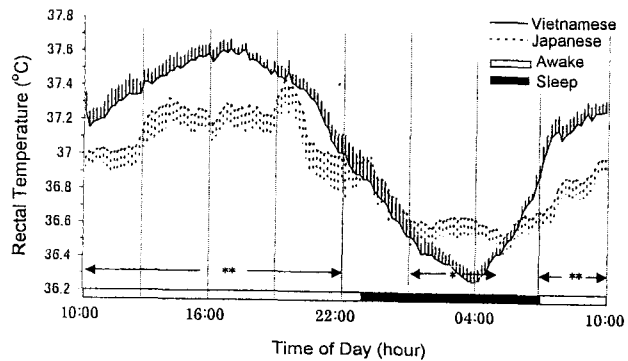
Japanese settlers (4M, 2F): 23-28 yrs, 168 cm 57 kg.



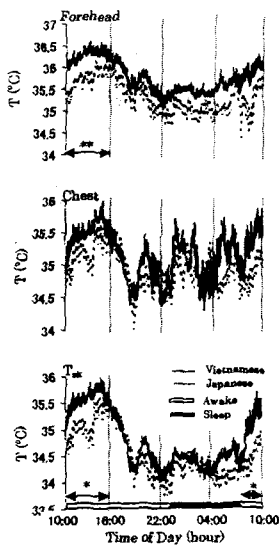
RESULTS



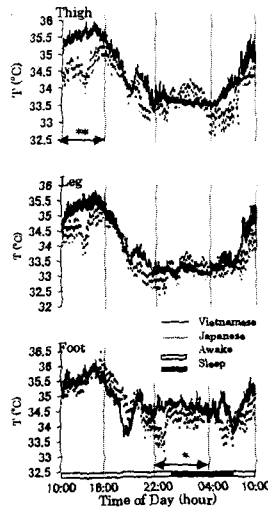
A comparison of the average of T_{re} rhythms between Vietnamese and Polish groups. Shaded area: SEM (n=5 or 6), ** p<0.05.



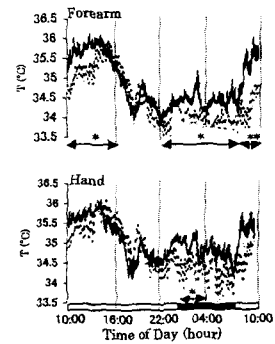
A comparison of the average of T_{re} rhythms between Vietnamese and Japanese groups. Shaded area: SEM (n = 6), *p<0.05, **p<0.01



A comparison of the average T_{sk} and skin temperatures of forehead and chest between the Vietnamese and Japanese subjects. Shaded area: SEM ($n = 6$).



A comparison of the average peripheral skin temperatures of the thigh, leg, foot, forearm and hand between the Vietnamese and Japanese group. Shaded area: SEM ($n = 6$).



DISCUSSION

1. Higher ambient temperature

- Higher core temperature during the daytime: saving water.
- Higher skin temperatures during the daytime (forehead, thigh, Forearm): effective heat dissipation or avoidance of heat penetration from surrounding.

2. Brighter illumination

- Lower core temperature at night by greater amount of melatonin secretion.