INFLUENCE OF MENSTRUAL CYCLE ON RESTING SKIN TEMPERATURE IN TRAINED AND UNTRAINED WOMEN USING INFRARED THERMOGRAPHY

Melanie Strohbach[1], Jesus A. Escalona Navarro[1], Daniel Schmidt [1], Andresa M.C. Germano[1]
[1]Institute of Human Movement Science and Health, Chemnitz University of Technology, Chemnitz, Germany
Email: melanie.strohbach@hsw.tu-chemnitz.de

Summary

This study examined the influence of menstrual cycle on lower extremity skin temperatures in trained (IG) and untrained (CG) women at rest. Whereas we did not observe an influence of the menstrual cycle on surface skin temperatures, significant differences ($p<0.05$) were found between trained and untrained women. Our data suggest no influence of the menstrual cycle and superior thermoregulations of trained women at rest.

Introduction

Infrared thermography is playing an important role when assessing physiological responses in sports science. Surface skin temperatures differ between trained and untrained individuals during exercise [1,2]. However, there is lacking evidence on the influence of fitness level for examinations in the resting period [3], which might provide insights for early detection of injuries or overuse. Moreover, research has predominantly focused on male athletes. However, to our best knowledge, possible effects of the menstrual cycle in trained and untrained females were not studied. Therefore, this study aimed to investigate the influence of the menstrual cycle and fitness level between trained and untrained women on thermal responses at rest.

Methods

Infrared thermography (HIKMICRO "G60 Handheld", China) was used to measure skin temperatures on nine female soccer players (IG; 20.8 ± 5.0 years; BMI of 22.4 ± 2.3; body fat 34.8 ± 3.1 %; weekly activity of 6.8 ± 1.0 h) and eight sedentary women (CG; 23.3 ± 2.4 years; BMI of 23.2 ± 2.6; body fat 34.2 ± 4.7 %; weekly activity of 0.9 ±1.0h). An app and a questionnaire were used to track the menstrual cycle, divided into follicular and luteal phase.

Participants underwent standardized preparations to minimize influences on thermoregulation. After a ten-minute acclimatization, thermal images were taken of the dominant leg, analyzing five regions of interest (ROIs): the anterior and posterior surface of the upper (FemA, FemP) and lower leg (TibA, TibP) and a reference point at the left anterior forearm (RP) at rest without previous activity. Mean values of the maximum temperatures of several weeks were determined. Inferential statistical tests ($\alpha = 5\%$) were used to investigate thermal influence on these ROIs between the groups.

Results and Discussion

There were no differences in surface skin temperatures between the phases of the menstrual cycle within the groups. However, significantly lower skin temperatures were found for IG compared to CG for TibA, TibP (e.g., Fig. 1), and RP during the follicular phase ($p<0.05$, Cohen´s $d > 1$). During the luteal phase, only TibP (CG) showed significantly higher temperatures compared to IG ($p=0.04$; Cohen´s $d=1.05$).

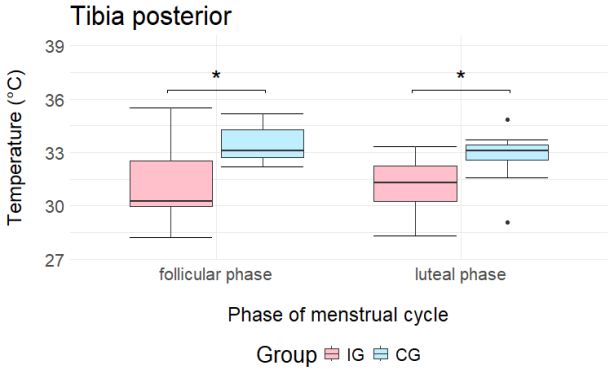

Figure 1: Maximum skin temperatures (Tmax) of Tibia posterior (TibP) of female soccer players (IG) and the untrained group (CG) for both phases of the menstrual cycle (follicular, luteal).

In line with [4], our results suggest no influence of the menstrual cycle on lower extremity skin temperatures. Moreover, it seems that sports athletes release body heat more efficiently due to their regular training [5], as our CG group exhibited higher surface skin temperatures. This may explain why untrained people showed higher temperature during activity [1,2]. At rest, our study showed temperature differences between active and untrained participants only for the lower legs, which could be explained by different blood supply of muscles leading to modified heat regulations [6]. A heterogeneous training of the IG could also explain different results.

Conclusions

This study showed no influence of the menstrual cycle on lower extremity skin temperatures in trained and untrained women. Based on these results, it can be concluded that infrared thermography may be a suitable tool for early detection of overloads and injuries in women. Future studies could compare athletes from different sports with varying physical demands and training routines.

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