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Autor(es): Hoekstra, Sven P.; Bishop, Nicolette C.; Leicht, Christof A.

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ELEVATED CORE TEMPERATURE: NOT ONLY USEFUL IN THE CONTEXT OF EXERCISE TO COMBAT CHRONIC LOW-GRADE INFLAMMATION?

Sven P. Hoekstra¹; Nicolette C. Bishop¹; Christof A. Leicht¹

KEYWORDS: passive heating; inflammatory response; heat shock protein 72; monocyte subsets; glucose control

INTRODUCTION

Regular exercise is suggested to be effective in reducing chronic low-grade inflammation, which in turn could enhance insulin sensitivity ⁽¹⁾. Since the increase in body temperature during exercise is one of the proposed inducers of the beneficial acute inflammatory response, passive heating could be an alternative strategy to combat chronic low-grade inflammation in individuals without the physical capacity to engage in sufficient exercise ⁽²⁾. This study investigates both the acute inflammatory response to hot water immersion (HWI) as well as the chronic effects of a HWI intervention period.

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METHODS

Nine sedentary, overweight (BMI: 31.0(4.3) kg/m²), healthy males were immersed in water set at 39°C for 1 hour, whilst 1 hour of seated rest at ambient temperature was used as control condition. Blood was drawn from an antecubital vein pre, post and 2 hours post-session. A resting blood sample was taken 3 days after completion of a 2-week intervention period consisting of 10 HWI sessions (5 sessions of 45 min followed by 5 sessions of 60 min). Main outcome measures were monocyte intracellular heat shock protein 72 (iHsp72),

¹ Loughborough University.

Email: s.p.hoekstra@lboro.ac.uk

the relative distribution of CD14⁺⁺/CD16⁻, CD14⁺⁺/CD16⁺ and CD14⁺/CD16⁺⁺ monocyte subsets, plasma interleukin (IL)-6 concentration and fasting blood glucose concentration.

RESULTS

HWI increased rectal temperature from 37.0(0.7)°C to 38.8(0.4)°C. The concentration of IL-6 ($p=0.048$) and the percentage of CD14⁺⁺/CD16⁺ ($p=0.004$) and CD14⁺/CD16⁺⁺ ($p=0.008$) monocytes were significantly higher compared to control immediately post-HWI, whilst iHsp72 was not changed after HWI at any time point. Resting levels of IL-6 and iHsp72 were not changed following the intervention period. However, there was a trend for an increase in the percentage of CD14⁺/CD16⁺⁺ monocytes ($p=0.104$) at rest and a significant decrease in fasting glucose levels following the intervention ($p=0.024$).

Conclusion: A single HWI session did induce an acute inflammatory response. This was, however, not accompanied by an acute elevation of monocyte iHsp72, possibly because the exposure to heat and the associated high rectal temperatures were not maintained for long enough. The 10 HWI sessions did not significantly alter the inflammatory markers at rest. Nevertheless, the lowering in fasting blood glucose concentration may indicate a positive change in glucose metabolism and/or insulin sensitivity, suggesting that HWI may induce some of the positive metabolic effects found after exercise training.

REFERENCES

1. Petersen, A.M.W. and Pedersen, B.K. (2005), "The anti-inflammatory effect of exercise", *J Appl Physiol*, Vol. 98⁽⁴⁾, pp. 1154–62.
2. Leicht, C.A., Kouda, K., Umemoto, Y., et al. (2015) "Hot water immersion induces an acute cytokine response in cervical spinal cord injury, *Eur J Appl Physiol*, 115⁽¹¹⁾, 2243–52.