

Article

Body temperature is elevated and linked to fatigue in relapsing-remitting multiple sclerosis, even without heat exposure



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Archives of physical medicine and rehabilitation (Impact Factor: 2.18). 01/2014; DOI: 10.1016/j.apmr.2014.02.004

ABSTRACT Objective

To investigate whether resting body temperature is elevated and linked to fatigue in patients with relapsing-remitting multiple sclerosis (RRMS).

Design

Cross-sectional study investigating (a) differences in resting body temperature across RRMS, SPMS, and healthy groups, and (b) the relationship between body temperature and fatigue in RRMS patients.

Setting

Climate-controlled laboratory (~22°C) within a non-profit medical rehabilitation research center.

Participants

Fifty patients with RRMS, 40 matched healthy controls, and 22 patients with secondary-progressive MS (SPMS).

Intervention

None.

Main Outcome Measure(s)

Body temperature was measured with an aural infrared thermometer (normal body temperature for this thermometer is 36.75°C), and differences were compared across RRMS, SPMS, and healthy persons. RRMS patients completed measures of general fatigue (Fatigue Severity Scale; FSS), as well as physical and cognitive fatigue (Modified Fatigue Impact Scale; MFIS).

Results

There was a large effect of group ($p < .001$, $\eta^2 = .132$) whereby body temperature was higher in RRMS patients ($37.04^\circ\text{C} \pm 0.27$) relative to healthy controls (36.83 ± 0.33 ; $p = .009$) and SPMS patients ($36.75^\circ\text{C} \pm 0.39$; $p = .001$). Warmer body temperature in RRMS patients was associated with worse general fatigue (FSS; $r = .315$, $p = .028$) and physical fatigue (pMFIS; $r = .318$, $p = .026$), but not cognitive fatigue (cMFIS; $r = -.017$, $p = .909$).

Conclusions

These are the first-ever demonstrations that body temperature is elevated endogenously in RRMS patients, and linked to worse fatigue. We discuss these findings in the context of failed treatments for fatigue in RRMS, including several failed randomized controlled trials (RCTs) of stimulants (modafinil). In contrast, our findings may help explain how RCTs of cooling garments and antipyretics (aspirin) have effectively reduced MS fatigue, and encourage further research on cooling/antipyretic treatments of fatigue in RRMS.