

HEAT STRAIN IN ELDERLY DURING HEAT WAVES IN THE NETHERLANDS

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INTRODUCTION

It is well documented that high ambient temperatures causes an increase in morbidity and mortality. Particularly elderly of over 75 years old are vulnerable for heat stress (Kovats and Hajat, 2008). Mackenbach et al. (1997) showed that an additional 10 elderly die every week in Dutch nursery homes when ambient temperatures are between 25 and 30°C compared to 15-20°C. Still many uncertainties exist with respect to the causes for heat-related excess mortality (Kovats and Hajat, 2008). From a thermal physiological view the load on the cardiovascular system dominates (e.g. Hess et al., 2009), while epidemiological data show that mortality in the heat is mainly related to respiratory issues (e.g. Stafoggia et al., 2006, Kovats and Hajat, 2008). The amount of heat strain and how elderly cope with heat strain has hardly been investigated and therefore is the topic of this study.

METHODS

Eight elderly were monitored during the hot July days in 2010 in The Netherlands. A weather station outside the building measured air temperature, air humidity, wind and radiation. Air temperatures inside were monitored in the living and sleeping room of the elderly using i-buttons. The Hidalgo system was used to monitor heart rate, pill temperature, body position and breathing rate. I-buttons at the back of the hand and just below the collar bone gave an indication of peripheral and central skin temperatures respectively. A questionnaire was filled in to quantify thermal behavior and experienced heat strain.

RESULTS

Fig. 1 shows the ambient temperature related to the temperature in the living room and sleeping room for an elderly lady aged over 80. Her fear for catching a cold due to draughts caused her to keep the windows closed in her bedroom. The temperature in the bedroom exceeded 30°C during the nights. Thermal strain is shown in Fig. 2. Core temperature exceeded 38°C in the afternoon. During the night body heat was redistributed to the skin which lead to very high skin temperatures (Van Someren et al., 2002). Similar effects were observed in the other elderly subjects, but core temperatures remained below 38°C.

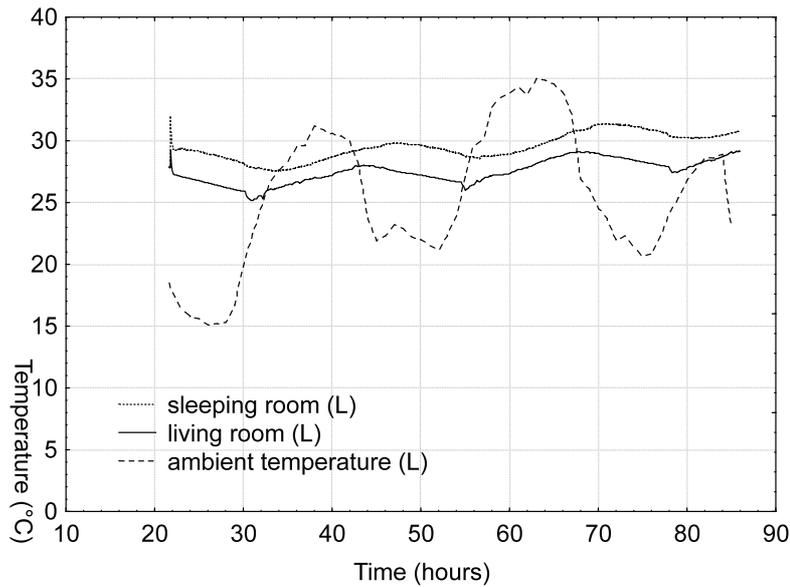


Fig. 1 Relation between ambient temperature and temperature in the living room and sleeping room for an elderly lady. Time is in hours (24, 48 and 72 hours equals midnight).

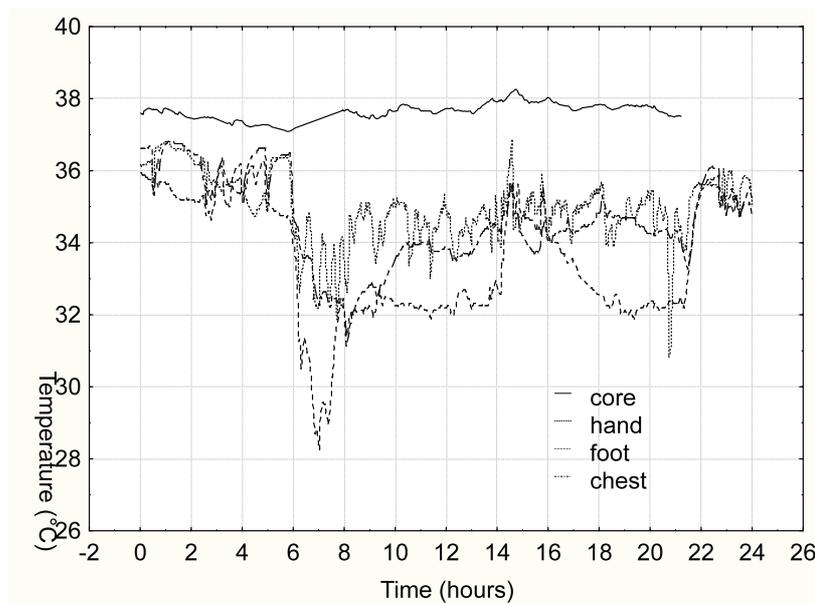


Fig. 2 Body core and skin temperatures during a hot summer day in an elderly lady

CONCLUSION

In summary, we observed very high core and skin temperatures in the elderly during hot days and during the night. Thermal behavior was often inadequate, e.g. absence of ventilation, wearing insulative clothing.

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