

Determining the Metabolic Rate of the Thai Elderly

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ABSTRACT

The elderly have a slower metabolism than the young, which affects their thermal perceptions and comfort, particularly in hot-humid climates. Understanding these differences is important to identify the thermal comfort levels of the elderly. The available data from Thailand is insufficient, so we analyzed the literature for a proxy to estimate the metabolic equivalent of task (MET) rate for Thai elderly (60 years old and over). A Vietnamese database was the most reasonable proxy, since the body size of Thai and Vietnamese are similar, with considerable similarity in culture, food, and climate. This study applied 18 human metabolism equations derived from the literature to the Vietnamese data. Following statistical analysis of the measured MET rate of the Vietnamese elderly, seven studies were found to be accurate to within a $\pm 10\%$ margin of error: Schofield (1985), WHO (1985), Owen et al. (1986), EU (1993), Muller et al. (2004), Henry (2005), and Wells et al. (2009). Of these, the aggregate equation (Wells et al., 2009) was the most convincing method for estimating the MET rate of the Thai elderly, since it incorporates the Southeast Asian context and limits bias. In conclusion, using the most accurate equation, the MET rate of the average Thai elderly is calculated as 1,560 kcal/day for males and 1,230 kcal/day for females, equivalent to 43.10 W/m^2 (0.966 kcal/kg/h) and 38.57 W/m^2 (0.884 kcal/kg/h), respectively.

Keywords: Metabolic rate, Elderly, Hot humid climate, Thai, Vietnamese

INTRODUCTION

An individual's metabolic equivalent of task (MET) is one of six main factors that determine thermal comfort. Most thermal comfort standards are based on the MET rate of an average adult. The elderly have a lower MET rate than younger adults, however, and typically have different thermal perceptions. Many studies have endorsed this position following clinical measurements conducted in the laboratory. First, the elderly have lower oxygen consumption in indirect calorimetry measurements (Kwan et al., 2004). Second, they have lower resting energy expenditure (REE) levels than the young as a result of progressive loss of fat free mass and a reduced MET rate in certain organs (Siervo et al., 2014). Third,