SWACSM Brief Abstract

Environmental Heat Stress and Physiological Heat Strain in Construction Workers During Work in the Summer

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ABSTRACT

Construction workers are thirteen times more likely to die from heat-related illnesses compared to the general population. This elevated risk results from the combination of metabolic heat production due to the physical demands of construction work associated with high environmental heat stress. However, it is important to recognize that the magnitude of heat stress experienced varies across job types within the construction industry reflecting the diversity of tasks performed. In addition, environmental heat stress can significantly vary for workers based on whether they operate in covered or uncovered work areas, creating varying levels of heat stress, particularly during during summer months. Notably, despite these evident risks, no previous study has assessed thermal strain via core temperature (Tcore) in construction workers during summertime in the United States. **PURPOSE**: To measure environmental heat stress and physiological heat strain in construction workers during work in the summer. **METHODS**: Over three days, 32 construction workers (3 females) agreed to participate in this study. Participants were identified by both job type and working conditions, depending upon their description of tasks and if they worked in a covered or uncovered area. Heart rate, Tcore, rating of perceived exertion, and thermal comfort were measured during a typical work in July. Additionally, hydration was assessed via pre and post-shift measurements of urine specific gravity and body weight. Heat index (HI) was calculated from dry bulb temperature and humidity continuous measurements in both covered and uncovered working environments. **RESULTS**: The highest observed peak HI was 34°C indicating low to moderate heat stress. Roofers were exposed to a higher HI compared to other job types, but no significant differences were observed between covered and uncovered areas. Metabolic rate calculated from HR and Tcore was higher in workers in uncovered areas compared to covered, but not different among job types. 43% of the participants had Tcore exceeding 38°C, with 4% exceeding 38.5°C. The majority of participants experienced a dehydration level of approximately 1%. **CONCLUSION**: Construction workers experience significant heat strain, even under conditions of moderate heat stress. This heat strain varies due to job type, which is highly variable in construction workers, and specific working environment.

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