

INTISARI

Global warming yang terjadi saat ini membuat lingkungan kerja pekerja konstruksi menjadi lebih berbahaya karena dapat memberikan *heat stress* berlebih bagi pekerja dan dapat menyebabkan terkenanya *heat-related illness*. Penggunaan *personal hazard control* berupa *body cooling* merupakan alternatif yang paling memungkinkan karena mudah untuk digunakan dan terbukti dapat menurunkan tingkatan *heat strain* pada pekerja. Penelitian ini bertujuan untuk menganalisis pengaruh penggunaan *cold water consumption* (CW), *forearm immersion* (FI), dan *wet towel* (WT) untuk mengurangi *heat strain* pada seseorang yang bekerja di lingkungan kerja pekerja konstruksi. Pengujian dilakukan pada 12 mahasiswa laki-laki ($25,17 \pm 2,15$ tahun) di ruang terkondisi yang disesuaikan dengan kondisi lingkungan kerja pekerja konstruksi (WBGT = $30,03 \pm 0,38$ °C; Kelembapan Udara = $49,80 \pm 5,09$ %; Suhu Udara = $36,13 \pm 0,48$ °C; Radiasi Matahari = $624,48 \pm 13,84$ W/m²). Parameter yang diukur selama pengujian adalah suhu timpani, suhu permukaan kulit, denyut jantung, *physiological strain index* (PSI), *sweat rate*, sensasi termal, kenyamanan termal, sensasi berkeringat, sensasi haus, *received of perceived exertion* (RPE), dan kinerja fisik. *Cold water consumption* ditemukan dapat menurunkan suhu timpani sebesar 0,047 °C pada tahap *Recovery 1* dan 0,044 °C pada tahap *Recovery 2*, dimana pada kondisi lainnya justru mengalami kenaikan. *Forearm immersion* ditemukan dapat secara signifikan menurunkan suhu permukaan kulit, denyut jantung, dan *sweat rate*, dibandingkan tanpa *body cooling* ($p < 0,05$). Penggunaan *wet towel* dinilai kurang efektif dibandingkan *cold water consumption* dan *forearm immersion* dikarenakan 8% subjek masih merasa panas pada sensasi termal di tahap *Recovery 1* dan *Recovery 2*, 8% subjek masih merasa sangat basah pada sensasi berkeringat di tahap *Recovery 2*, dan 25% subjek merasa sangat haus pada sensasi haus di tahap *Activity 2* yang merupakan tertinggi dibandingkan kondisi lainnya. Tidak terdapat perbedaan yang signifikan antar kondisi pada respon subjektif RPE dan kinerja fisik. Penggunaan *forearm immersion* dapat menjadi alternatif strategi *body cooling* terbaik untuk mengurangi tingkatan *heat strain* pada seseorang yang bekerja di lingkungan kerja pekerja konstruksi.

Kata kunci: *Global Warming*, Lingkungan Kerja Pekerja Konstruksi, *Heat-related Illness*, *Heat Strain*, *Body Cooling*

ABSTRACT

Global warming that occurs today makes the construction work environment more dangerous because it can induce excessive heat stress for workers and can cause heat-related illness. The use of personal hazard control in the form of body cooling is the conceivable alternative because it is easy to apply and has been proven to reduce the level of heat strain in workers. The objective of this study is to analyze the effect of cold water consumption (CW), forearm immersion (FI), and wet towel (WT) in reducing heat strain in someone working in a construction work environment. Twelve male students, aged 25.17 ± 2.15 years old, took part in experiments in climate chamber room designed to simulate the working conditions of construction workers ($WBGT = 30.03 \pm 0.38$ °C, Relative Humidity = 49.80 ± 5.09 %, $T_{air} = 36.13 \pm 0.48$ °C, and solar irradiance = 624.48 ± 13.84 W/m²). Tympanic temperature, skin temperature, heart rate, sweat rate, physiological strain index (PSI), thermal sensation, thermal comfort, wet sensation, thirst sensation, received perceived exertion (RPE), and physical performance were all measured during the experiment. Cold water consumption was reported to lower tympanic temperature in both Recovery 1 for 0,047 °C and Recovery 2 for 0,044 °C. Forearm immersion has been shown to significantly decrease skin temperature, heart rate, and sweat rate rather than without body cooling ($p < 0,05$). The use of wet towel is considered to be less effective than cold water consumption and forearm immersion because 8% of subjects still feel hot in the thermal sensation in the Recovery 1 and Recovery 2 stages, 8% of subjects still feel very wet in the wet sensation in the Recovery 2 stages, and 25% of subjects feel very thirsty in the thirst sensation in the Activity 2 stage, which is the highest among the conditions. There was no significant difference in RPE and Physical Performance. Forearm immersion may be the most effective alternative body cooling for reducing heat strain in a construction work environment.

Keyword: Global Warming, Construction Work Environment, Heat-related Illness, Heat Strain, Body Cooling