

INTISARI

Aktivitas fisik di lingkungan dengan paparan panas yang tinggi dapat menyebabkan perubahan pada suhu inti normal tubuh dan memicu terjadinya *heat strain*. Salah satu cara untuk mengurangi risiko terjadinya *heat strain* adalah mengonsumsi cairan (*hydration fluid*) bersuhu dingin sebelum melakukan aktivitas fisik atau yang disebut dengan *pre-cooling*. Minuman elektrolit banyak digunakan sebagai *hydration fluid* karena dapat menggantikan zat-zat elektrolit tubuh yang hilang selama beraktivitas. Penelitian ini bertujuan untuk mengetahui pengaruh konsumsi minuman elektrolit dan air kelapa muda bersuhu dingin terhadap respon termoregulasi tubuh ketika beraktivitas di lingkungan panas.

Subjek penelitian sebanyak sembilan orang laki-laki (usia: $22,3 \pm 0,8$; berat badan: $70,8 \pm 4,2$; tinggi badan: $169,8 \pm 3,1$) melakukan aktivitas fisik berupa lari di *treadmill* dengan beban kerja setara dengan $65\% HR_{max}$ di ruangan bersuhu $36.5 \pm 0.8^{\circ}C$ dengan kelembaban relatif $72 \pm 6\%$. Setiap subjek mengalami 3 kondisi eksperimen yaitu kondisi kontrol (*no fluid*), kondisi pemberian minuman elektrolit dan kondisi pemberian air kelapa muda, di hari yang berbeda dan dengan urutan acak. Kedua cairan dikonsumsi pada suhu $4^{\circ}C$ dan volume 7.5 mL/kg berat badan subjek. Konsumsi cairan dilakukan pada 10 menit awal fase *baseline*. Variabel yang diukur pada penelitian ini adalah temperatur timpani (Tty), temperatur kulit (Tsk), denyut jantung (HR), *body heat storage* (ΔS), *thermal comfort* (TC), *thermal sensation* (TS), *thirst sensation* (SH), *rate perceived exertion* (RPE), *nausea*, *vomiting* dan *drinking pleasure* (DP). Analisis data dilakukan dengan menggunakan uji *repeated measure ANOVA* yang dilanjutkan dengan uji *Post-Hoc* dengan *Bonferonni correction*.

Hasil penelitian menunjukkan bahwa konsumsi minuman elektrolit dan air kelapa muda berpengaruh signifikan dalam menurunkan respon fisiologis dan meningkatkan respon subjektif dibandingkan kondisi kontrol sehingga mampu mendukung respon termoregulasi tubuh. Meskipun demikian, kedua jenis minuman tidak memberikan perbedaan pengaruh yang signifikan terhadap respon fisiologis dan subjektif kecuali pada parameter *thermal sensation*, dimana air kelapa muda memberikan sensasi termal yang lebih sejuk dibandingkan minuman elektrolit. Dari hasil tersebut, dapat disimpulkan bahwa air kelapa muda memiliki kemampuan yang sama seperti minuman elektrolit dalam menjaga termoregulasi tubuh sehingga dapat digunakan sebagai alternatif *hydration fluid* sebelum melakukan aktivitas di lingkungan panas.

Kata kunci: *heat strain*, minuman elektrolit, air kelapa muda, teknik *pre-cooling*, respon termoregulasi.

ABSTRACT

Physical activities in an extreme hot environment may cause an increase in body core temperature and result in heat strain. One of countermeasures in reducing the heat strain is consuming cold hydration fluid before performing any physical activities (pre-cooling). Electrolyte drink is widely used as hydration fluid because of its ability to replace electrolytes lost within our body during activities. The purpose of this study is to determine the effects of consuming electrolyte drink and young coconut water prior to physical activity on body's thermoregulatory response in the heat.

Nine male subject (age: 22.3 ± 0.8 years; weight: 70.8 ± 4.2 kg; height: 169.8 ± 3.1 cm) performed a treadmill activity at 65% HR_{max} in a chamber set at 36.6 ± 0.8 °C of air temperature and $72 \pm 6\%$ of relative humidity. Each subject underwent three experiment conditions, without fluid ingestion, with electrolyte drink ingestion, and with young coconut water ingestion, in separated days and in random order. Both drink temperature was set at 4°C and subjects ingested 7.5 mL kg^{-1} body mass 30 min prior to the physical activity. The variables measured throughout experiment were tympanic temperature, skin temperature, heart rate, body heat storage, thermal comfort, thermal sensation, thirst sensation, rate perceived exertion (RPE), nausea, vomiting and drinking pleasure. Data were analyzed using repeated measure ANOVA followed with a simple post hoc test with Bonferonni correction in case significance was found.

The result showed that cold fluid ingestion before physical activity, both electrolyte drink and young coconut water, significantly decreased physiological strains and improved subjective responses compared to condition without fluid ingestion. These indicated improvement thermoregulatory responses during physical activity. There were no significant differences in any physiological and subjective responses during physical activity between ingesting electrolyte drink and young coconut water before physical activity. However, ingesting young coconut water provided cooler thermal sensation than electrolyte drink did. From these results, it can be concluded that young coconut water has a similar level of thermoregulatory improvement as electrolyte drink. Therefore, it can be used as an alternative of hydration fluid before performing any activities in hot environment.

Keywords: *heat strain, electrolyte drink, young coconut water, pre-cooling technique, thermoregulatory responses.*