INTISARI

Aktivitas fisik di lingkungan panas dengan kelembaban yang tinggi dapat mempengaruhi performansi dan mengakibatkan terjadinya *heat strain* yang serius karena adanya peningkatan temperatur inti tubuh yang berlebihan. Untuk mengantisipasi hal ini, perlu adanya teknik penurunan temperatur tubuh, salah satunya dengan *internal precooling*. Penelitian ini mengkaji tentang efektivitas air kelapa dalam bentuk cairan dingin dan *ice slurry* sebagai strategi internal *precooling* terhadap respon fisiologis dan subjektif ketika melakukan aktivitas fisik di lingkungan panas. Air kelapa dipilih karena manfaatnya bagi kesehatan serta ketersediaannya yang melimpah di Indonesia.

Sembilan orang laki-laki (umur: 22,1±0,9 tahun; tinggi 169,8±3,1 cm; berat badan 70,8±4,2 kg) melakukan aktivitas lari di atas *treadmill* dengan beban 65% HR_{max} selama 30 menit dilanjutkan dengan 30 menit *recovery* di ruang terkondisi dengan temperatur 36,6±0,8^{o}C dan kelembaban 72±6%. Eksperimen dilaksanakan pada tiga kondisi, yaitu kondisi tanpa asupan cairan (KON), kondisi asupan air kelapa muda berbentuk cair bersuhu 4^{o}C (CF), dan kondisi asupan air kelapa muda berbentuk *ice slurry* bersuhu -1,4^{o} C (ICE). Asupan yang diberikan pada fase *fluid ingestion* adalah air kelapa kemasan (Hydro Coco) sejumlah 7,5mL/kg masa tubuh. Temperatur timpani, temperatur kulit, temperatur tubuh, denyut jantung, *body heat storage*, *thermal comfort*, *thermal sensation*, *thirst sensation*, *rate of perceived exertion*, *nausea*, dan *drinking pleasure* digunakan sebagai variabel pengukuran. Analisis statistik dilakukan dengan menggunakan uji *repeated measured*-ANOVA yang dilanjutkan uji *Post-Hoc* dengan *Bonferonni correction*.

Hasil penelitian menunjukkan tidak ada perbedaan temperatur timpani antara kondisi ICE dan CF. Akan tetapi, mengonsumsi *ice slurry* sebelum aktivitas fisik memberikan hasil yang lebih signifikan dalam menurunkan temperatur timpani di akhir aktivitas fisik dibandingkan mengonsumsi air kelapa muda dalam bentuk cair. Kondisi ICE juga lebih efektif dalam menurunkan denyut jantung dan meningkatkan *heat sink* pada fase *pre-exercise* dibandingkan dengan kondisi CF. Selain itu, kondisi ICE memberikan kenyamanan termal dan persepsi pengeluaran tenaga lebih baik dibandingkan dengan kondisi CF. Dari hasil tersebut, dapat disimpulkan bahwa air kelapa muda dalam bentuk *ice slurry* dapat digunakan sebagai alternatif *internal precooling* yang lebih efektif dalam menurunkan *heat strain* ketika melakukan aktivitas fisik di lingkungan panas dibandingkan dalam bentuk cairan.

Kata kunci : *Heat strain, air kelapa muda (Cocos nucifera L.), internal precooling, ice slurry, respon termoregulasi.*

ABSTRACT

Physical activity in hot-humid environment can affect performance and may lead to serious heat strain due to an excessive increase in core temperature. An internal pre-cooling technique is necessary to decrease the core body temperature as countermeasure. This study examined the effectiveness of young coconut water in the form of cold fluid and ice slurry as an internal precooling strategy on physiological and subjective responses during physical activity in hot environment. Coconut water was selected considering its benefits for health and its availability in Indonesia.

Nine males (age: 22,1 ± 0,9 years old; height: 169,8 ± 3,1 cm; weight: 70,8 ± 4,2 kg) performed treadmill activities at 65% HR_{max} for 30 min followed by 30 min recovery in a chamber set at 36,6±0,8 ºC of air temperature and 72±6% of relative humidity. They underwent three experiment conditions, condition without the fluid intake (KON), condition with young coconut water intake in the form of liquid (CF) and ice slurry (ICE), in separated days and in random order. Each participants ingested 7,5 mL kg^{-1} body mass of commercial young coconut water (Hydro Coco) 30 min prior to starting the physical activity. Tympanic temperature, skin temperature, body temperature, heart rate, body heat storage, thermal comfort, thermal sensation, thirst sensation, rate of perceived exertion, nausea, and drinking pleasure were measured throughout the experiment session. Repeated measures ANOVAs followed by simple post-hoc test with Benferonni correction were employed to evaluate differences in measured variables..

The results showed no significant difference in tympanic temperature between that ICE and CF conditions. However, ingesting ice slurry (ICE) prior to starting exercise had more significant effect in lowering tympanic temperature at the end of physical activity compared to ingesting young coconut water in liquid form (CF). ICE condition also showed significant effect in reducing heart rate and improve heat sink at pre-exercise phase. In addition, ICE condition also had significant effect in improving thermal comfort and perceived exertion during physical activities in comparison with CF condition. From these results, it can be concluded that young coconut water in the form of ice slurry can be used as an alternative internal precooling which is more effective in reducing heat strain during physical activity in hot-humid environment compared to CF condition.

Keywords: *Heat strain, young coconut water (Cocos nucifera L.), internal precooling, ice slurry, thermoregulation responses.*