

Kajian terhadap Kadar Katalase, Kadar Hidrogen Peroksida (H₂O₂) darah dan Ekspresi *Glucose Transporter-4* (GLUT-4) pada Sel Otot Rangka

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INTISARI

LATAR BELAKANG

Minyak pepermin merupakan salah satu minyak esensial yang memiliki aktivitas antioksidan yang dapat menurunkan kadar *reactive oxygen species* (ROS). *Acute Single bout eccentric exercise* (ASBEE) merupakan olahraga akut yang dapat menyebabkan peningkatan ROS dan berakibat cedera otot rangka. Penelitian ini bertujuan untuk mengkaji efek pemberian minyak pepermin terhadap hewan coba yang diinduksi ASBEE terutama mengkaji katalase, hidrogen peroksida darah dan ekspresi GLUT-4 sel otot rangka.

METODE

Sebanyak 30 ekor tikus wistar (*Rattus norvegicus*) berusia 20-24 minggu dengan berat 160-350 gram dibagi menjadi enam kelompok perlakuan. Kelompok P1 (n=5), P2 (n=4) dan P3 (n=5) diberi minyak pepermin per oral dosis bertingkat 0,25 gr/kg BB, 0,5 gr/kg BB, 1,0 gr/kg BB satu jam sebelum diinduksi ASBEE; kelompok CA (n=5) tidak diberi apapun dan diinduksi ASBEE; kelompok C0 (n=5) tidak diberi apapun dan tidak diinduksi ASBEE; dan kelompok CE (n=6) diberi vitamin E dengan dosis 400 mg/kg BB satu jam sebelum induksi ASBEE. Induksi ASBEE dilakukan dengan *downhill running* -5° pada treadmill tikus (Gamatread) dengan beban 70% indeks VO₂ max selama 30 menit. 24 jam setelah induksi ASBEE, sampel darah dan jaringan otot diambil untuk pemeriksaan katalase, hidrogen peroksida dan GLUT-4.

HASIL

Hasil penelitian menunjukkan terjadi penurunan kadar katalase darah serta penurunan kadar hidrogen peroksida darah pada kelompok P1, P2, P3, dan CE. Terjadi sebaliknya pada kelompok CA. Ekspresi GLUT-4 tidak menunjukkan adanya pengaruh bermakna pada setiap kelompok.

KESIMPULAN

Disimpulkan bahwa minyak pepermin dapat memperbaiki kondisi stress oksidatif yang diakibatkan oleh ASBEE akan tetapi tidak terbukti mencegah resistensi insulin sementara setelah induksi ASBEE.

Kata kunci: minyak pepermin, *acute single bout eccentric exercise*, GLUT-4, katalase, hidrogen peroksida



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TRANSPORTER-4 (GLUT-4) EXPRESSION ON SKELETAL MUSCLE CELLS
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Study on blood catalase and hydrogen peroxide (H_2O_2) and Expression of *Glucose Transporter -4 (GLUT-4)* on the Muscle Cells

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ABSTRACT

BACKGROUND

Peppermint oil is one of the essential oils with antioxidant activity that can reduce levels of *reactive oxygen species* (ROS). An *acute single bout of eccentric exercise* (ASBEE) is an acute exercise activity that can lead to increased ROS and cause skeletal muscle injury. This study aimed to assess the effect of peppermint oil in experimental animals induced with ASBEE with the purpose to measure catalase, hydrogen peroxide blood and GLUT-4 expression of skeletal muscle cells.

METHOD

A total of 30 Wistar rats (*Rattus norvegicus*) aged 20-24 weeks, weighing 160-350 grams were divided into six treatment groups. The P1 (n = 5), P2 (n = 4) and P3 (n = 5) groups were given oral doses of peppermint oil per graded levels 0.25 g/kg, 0.5 g/kg, 1.0 g/kg BB, respectively, one hour before ASBEE induction; CA group (n = 5) were not given any and only induced with ASBEE; C0 group (n = 5) were not given anything and not induced with ASBEE; and CE group (n = 6) were given vitamin E at a dose of 400 mg/kg body weight one hour before ASBEE induction. ASBEE induction was done by *downhill running* on a rat treadmill -5° (Gamatread) with a load index of 70% VO_2 max for 30 minutes. 24 hours after induction of ASBEE, blood samples and muscle tissue were taken for examination of catalase, hydrogen peroxide and GLUT-4 levels.

RESULTS

The results showed decreased levels of blood catalase and decreased blood levels of hydrogen peroxide in groups P1, P2, P3, and CE. The opposite occurred in the group CA. The expression of GLUT-4 did not show any significant difference between groups.

CONCLUSION

It was concluded that peppermint oil can improve the condition of oxidative stress caused by ASBEE.

Keywords: peppermint oil, *acute single bout of eccentric exercise*, GLUT-4, catalase, hydrogen peroxide