KESAN SUPLEMENTASI VITAMIN E SAWIT KE ATAS STATUS OKSIDATIF DALAM PEMBENTUKAN KATARAK YANG DIARUH STEROID

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TESIS YANG DIKEMUKAKAN UNTUK MEMENUHI SEBAHAGIAN
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ABSTRAK

Kajian ini bertujuan untuk mengkaji kesan suplementasi vitamin E sawit (palmvitee; 70% tokotrienol, 30% tokoferol) ke atas status oksidatif dalam pembentukan katarak yang diaruh steroid. Sebanyak tiga puluh enam ekor arnab jantan, spesis *New Zealand White* (1.5-2.0 kg) dibahagikan kepada enam kumpulan iaitu kumpulan A (kawalan; minyak zaitun); kumpulan B (minyak zaitun dan prednisolone acetate 1% (PA 1%) (dos 1 mg/kg berat badan; bw); kumpulan C (3 mg/kg bw vitamin E sawit); kumpulan D (PA 1% (dos 1 mg/kg bw) bersama 3 mg/kg bw vitamin E sawit); kumpulan E (15 mg/kg bw vitamin E sawit) dan kumpulan F (PA 1% (dos 1 mg/kg bw) bersama 15 mg/kg bw vitamin E sawit). PA 1% dititiskan ke atas mata untuk mengaruh katarak, manakala vitamin E sawit diberi secara oral. Darah diambil pada 0 minggu dan pada setiap 2 minggu berikutnya sehinggalah salah satu kumpulan arnab ini membentuk katarak. Apabila ini berlaku, semua kumpulan disembelih. Aras MDA, aktiviti enzim antioksidan (SOD, GPx dan CAT) dan kepekatan vitamin E dalam darah diuji. Analisis protein secara SDS-PAGE dilakukan ke atas kanta mata. Pemeriksaan oftalmoskop juga dilakukan pada setiap minggu. Pada minggu 10, oftalmoskopi menunjukkan pembentukan katarak pada kumpulan B dan D tetapi tidak pada kumpulan F. Hasil analisis biokimia mendapati peningkatan aras MDA yang signifikan ($p<0.05$) pada kumpulan B. Suplementasi vitamin E sawit pada kumpulan-kumpulan yang diaruh katarak (kumpulan D dan F) dapat menghalang peningkatan aras MDA pada minggu 10. Aras MDA pada kumpulan yang disuplementasi 15 mg/kg vitamin E sawit (kumpulan F) menurun secara signifikan ($p<0.05$) berbanding kumpulan yang disuplementasi 3 mg/kg vitamin E sawit (kumpulan D). Pada minggu 10, aktiviti SOD kumpulan B didapati menurun secara signifikan ($p<0.05$) berbanding minggu 0. Suplementasi vitamin E sawit pada kumpulan yang diaruh katarak (kumpulan D dan F) dapat meningkatkan aktiviti SOD secara signifikan ($p<0.05$) berbanding kumpulan B pada minggu 10. Pada suplementasi vitamin E sawit dos 3 mg/kg (kumpulan D), aktiviti SOD didapati lebih tinggi secara signifikan ($p<0.05$) berbanding dos yang lebih tinggi pada minggu ke 10. Aktiviti GPx pada kumpulan B dan F meningkat secara signifikan ($p<0.05$) berbanding kumpulan A dan D pada minggu katarak terbentuk (minggu 10). Aktiviti CAT pada kumpulan B menurun secara signifikan ($p<0.05$) pada minggu ke 10 berbanding minggu 0. Suplementasi vitamin E sawit pada kumpulan-kumpulan yang diaruh katarak (kumpulan D dan F) meningkatkan aktiviti CAT dengan signifikan ($p<0.05$) pada minggu 10 berbanding kumpulan B. Kepekatan vitamin E pada kumpulan B meningkat dengan signifikan ($p<0.05$) pada minggu 10 berbanding minggu 0. Suplementasi vitamin E pada kumpulan-kumpulan yang diaruh katarak (kumpulan D dan F) meningkatkan kepekatan vitamin E dengan signifikan ($p<0.05$) berbanding kumpulan B pada minggu terbentuknya katarak (minggu 10). Kepekatan vitamin E kumpulan F meningkat dengan signifikan ($p<0.05$) berbanding kumpulan D pada minggu 10. Analisis protein kanta tidak menunjukkan sebarang perbezaan jalur-jalur protein pada semua kumpulan. Kesimpulannya, suplementasi vitamin E sawit memberi keputusan positif dengan melambatkan pembentukan katarak yang diaruh steroid pada arnab. Ini berkolerasi dengan pengurangan tekanan oksidatif yang ditunjukkan oleh aras MDA yang lebih rendah bagi kumpulan yang diberi suplementasi vitamin E sawit.

THE EFFECTS OF PALM VITAMIN E SUPPLEMENTATION ON OXIDATIVE STATUS IN STEROID-INDUCED CATARACT FORMATION

ABSTRACT

The aim of this study was to determine the effects of palm vitamin E supplementation (palmvitee, 70% tocotrienol, 30% tocopherol) on oxidative status in the formation of steroid-induced cataract. Thirty-six male *New Zealand White* rabbits (1.5-2.0 kg) were divided into six groups; Group A (control, olive oil); group B (olive oil and prednisolone acetate 1% (PA1%) (1 mg/kg body weight; bw)); group C (palm vitamin E 3 mg/kg bw); group D (PA1% (1 mg/kg bw) with palm vitamin E 3 mg/kg bw); group E (palm vitamin E 15 mg/kg bw) and group F (PA1% (1 mg/kg bw) with palm vitamin E 15 mg/kg bw). PA1% was instilled onto the eye to induce cataract, while palm vitamin E was instituted by oral feeding. Blood was taken at week 0 and subsequently every two weeks until cataract was formed in one of the groups, upon which, all rabbits were slaughtered. MDA level, enzyme antioxidant activities (SOD, GPx and CAT) and vitamin E concentration in the blood were determined and protein analysis (SDS-PAGE) of the lens was carried out. Ophthalmoscopy examination was also carried out every week. At week 10, ophthalmoscopy showed formation of cataract in groups B and D but not in group F. Biochemical analysis showed a significant increase ($p<0.05$) in the level of MDA in group B. Supplementation with palm vitamin E to the cataract induced groups (groups D and F) was found to prevent the increase in MDA at week 10. The MDA level in group supplemented with 15 mg/kg palm vitamin E (group F) reduced significantly ($p<0.05$) compared to group supplemented with 3 mg/kg palm vitamin E (group D). At 10^{th} week, SOD activity in the group B showed a significant decrease ($p<0.05$) compared to week 0. Supplementation with palm vitamin E to the cataract induced groups (groups D and F) significantly increased ($p<0.05$) SOD activity compared to group B at week 10. Supplementation with 3 mg/kg palm vitamin E (group D) increased SOD activity significantly ($p<0.05$) compared to the higher dose at week 10. GPx activity in groups B and F were increased significantly ($p<0.05$) compared to groups A and D at the week cataract was formed (week 10). CAT activity in the group B was reduced significantly ($p<0.05$) at week 10 compared to week 0. Supplementation with palm vitamin E to the cataract induced groups (groups D and F) increased significantly ($p<0.05$) the CAT activity at week 10 as compared to group B. Vitamin E concentration in group B increased significantly ($p<0.05$) at week 10 compared to week 0. Supplementation with palm vitamin E to the cataract induced groups increased vitamin E concentration significantly ($p<0.05$) compared to group B at the week cataract was formed (week 10). Vitamin E concentration in group F increased significantly ($p<0.05$) compared to group D at week 10. Protein analysis of the lens did not show any differences in the protein bands in all groups. In conclusion, supplementation with palm vitamin E gives positive result with slowed down the formation of steroid-induced cataract in rabbits. This appears to correlate with the reduction in oxidative stress as shown in the lower MDA level in the supplemented group with palm vitamin E.

KANDUNGAN

SENARAI FOTOGRAF

SENARAI JADUAL

SENARAI RAJAH

SENARAI SIMBOL

%	peratus
&	dan
<	kurang daripada
>	lebih daripada
g	gram
mg	milligram
kg	kilogram
µg	mikrogram
rpm	putaran per minit
°C	Celsius
ml	mililiter
µl	mikroliter
dl	desiliter
M	Molar
mM	milimolar
nmol	nanomol
cm	sentimeter
mm	milimeter
µm	mikrometer
pH	log kepekatan ion hidrogen
Hb	hemoglobin
p	kebarangkalian
kDa	kilodalton
V	Volt

BAB I

PENDAHULUAN

1.1 LATAR BELAKANG

Katarak merupakan sejenis penyakit mata yang disebabkan oleh kanta mata menjadi keruh dan cahaya tidak dapat menembusinya. Penyakit ini merupakan penyebab utama kecacatan penglihatan pada peningkatan usia dan boleh menyebabkan buta (Varma 1991). Menurut Foster (1999), bilangan orang buta yang disebabkan oleh katarak di dunia ini dijangka meningkat satu juta setiap tahun, manakala bilangan mata pesakit yang dibedah dengan akuiti penglihatan kurang daripada 6/60 meningkat dengan kadar 4 hingga 5 juta setahun.

Taylor (1999) menyatakan untuk mengetahui etiologi katarak adalah penting mengenalpasti jenis dan keterukan opasiti kanta seperti dos jangkamasa pendedahan kepada faktor risiko penyakit. Etiologi katarak yang utama adalah dengan peningkatan umur. Antara faktor risiko yang lain ialah pendedahan terhadap radiasi UV-B, kekurangan pengambilan diet antioksidan (vitamin E, C dan karotenoid), diabetes, dehidrasi, keterukan diarea, penggunaan dadah terapeutik (steroid, nikotin) dan alkohol.

Kehadiran antioksidan seperti vitamin E adalah amat penting dalam pertahanan utama tubuh bagi melawan radikal bebas untuk mengekalkan kesihatan yang optimum. Banyak kajian telah membuktikan bahawa vitamin E boleh mencegah dan menghalang kejadian penyakit kronik seperti penyakit jantung, kanser dan juga katarak (Meydani 1995).

Kajian Seth dan Karb (1999) mendapati berlakunya perubahan saiz opasiti kanta secara signifikan dalam pesakit katarak kortikal yang menerima terapi vitamin E berbanding placebo. Ohta et al. (1997) pula mendapati vitamin E boleh melambatkan kataraktogenesis dalam tikus yang diaruh dengan diet 25% galaktos. Kajian oleh Ross et al. (1983) juga mendapati vitamin E dapat menghalang kerosakan kanta yang disebabkan oleh radiasi melalui mekanisme kestabilan membran dan pemerangkap radikal bebas.

Malaysia merupakan pengeluar minyak sawit terbesar dunia yang mana minyak sayuran ini mengandungi sumber vitamin E yang amat tinggi. Vitamin larut lemak ini bertindak sebagai antioksidan pemutus rantai radikal bebas dan juga berperanan dalam menstabilkan membran sel. Vitamin ini terdiri daripada dua siri homolog utama iaitu tokoferol dan tokotrienol. Minyak kelapa sawit yang ditulenkan mengandungi lebih kurang 350-450 ppm vitamin E, yang terdiri daripada isomer 30% tokoferol dan 70% tokotrienol. Minyak kelapa sawit berbeza dengan minyak sayuran yang lain seperti jagung, soya dan bunga matahari, yang mana mereka merupakan sumber tokoferol yang baik tetapi tidak mengandungi tokotrienol (Sambanthamurti et al. 2000). Keberkesanan vitamin E sawit ini telahpun dikaji ke atas sel kanser, aras kolesterol dan pembentukan aterosklerosis dengan memberikan keputusan yang positif dengan mengurangkan risiko penyakit-penyakit ini (Wan Zurinah et al. 1991; Qureshi et al. 1991).

Walaupun telah banyak kajian mengenai katarak dan vitamin E dijalankan, kebanyakan penyelidik hanyalah menggunakan alfa-tokoferol. Maka kajian ini menggunakan vitamin E sawit yang mengandungi kedua-dua isomer iaitu tokoferol dan tokotrienol yang diperolehi daripada Malaysian Palm Oil Board (MPOB) untuk profilaksis katarak memandangkan kajian terhadapnya masih kurang. Diharap dengan mengkaji status oksidatif dalam darah sampel arnab seperti aras MDA, aktiviti enzim antioksidan (SOD, GPx dan CAT) dan kepekatan vitamin E, mekanisme sebenar tindakan vitamin E sawit ini ke atas pembentukan katarak yang diaruh steroid dapat diketahui dan dapat memberi manfaat dalam memperkembangkan lagi kepentingan minyak sawit Malaysia untuk meningkatkan taraf kesihatan penduduk dunia.

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