The metabolic effects of di (2-ethyl hexyl) phthalate medium dose on lipid profi les in serum and liver tissue

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Abstrak

Latar belakang: Di (2-ethyl hexyl) phthalate merupakan bahan plasticizer yang banyak digunakan pada kantong darah untuk transfusi. Bahan ini dapat mempengaruhi metabolisme lipid. Penelitian ini bertujuan menyelidiki efek metabolik di (2-ethyl hexyl) phthalate dosis tengah pada profi l lipid dalam serum dan jaringan hati.

Metode: Tikus percobaan galur Sprague Dawley diberi diet yang disuplementasi dengan 1,0% di (2-ethyl hexyl) phthalate (kelompok DEHP, n=5) dan diet yang tak disuplementasi (kelompok kontrol, n=5) selama 10 hari. Hewan percobaan dibiarkan mendapatkan makanan secara ad libitum. Kadar lipid dalam serum diukur menggunakan enzyme assay kits. Lipid jaringan hati diekstraksi dan konsentrasinya ditentukan. Sepotong jaringan hati diambil untuk menentukan aktivitas malic enzyme dan carnitine palmitoyl transferase-1 (CPT-1).

Hasil: Kadar lipid serum kelompok DEHP menurun dibandingkan dengan kelompok kontrol (P<0,05), di mana kadar lipid serum (mg/dL) pada kelompok kontrol dan DEHP masing-masing: trigliserida (TG) (100,5±16,5) dan (31,2±1,7); fosfolipid (PL) (143,3±7,8) dan (88,9±3,2); kolesterol total (88,7±4,6) dan (51,9±2,3); dan kolesterol HDL (high-density lipoprotein) (29,8±1,0) dan (16,1±0,7). Kandungan PL hati pada kelompok DEHP meningkat secra bermakna dibandingkan dengan kelompok kontrol (P<0,05); peningkatannya mencapai 15%. Kandungan lipid hati (mg/g jaringan) pada kedua kelompok masing-masing: TG (40,8±4,4) dan (23,7±1,3); kolesterol total (3,36±0,29) dan (2,33±0,23); PL (36,5±1,0) dan (41,7±0,6). Aktivitas malic enzyme dan CPT-1 masing-masing meningkat sebesar 4,35 dan 2,33 kali kelompok kontrol.

Kesimpulan: Di (2-ethyl hexyl) phthalate dosis tengah menurunkan sekresi lipid dari sel-sel hati ke dalam aliran darah. Kandungan TG dan kolesterol total sel-sel hati juga berkurang, sebaliknya kadar fosfolipid hati meningkat. Peningkatan fosfolipid hati disertai peningkatan aktivitas malic enzyme dan CPT-1 merupakan faktor utama penurun kadar lipid serum, TG dan kolesterol sel-sel hati yang diinduksi oleh di (2-ethyl hexyl) phthalate.
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Abstract
Background: Di (2-ethyl hexyl) phthalate is the most widely used plasticizer in blood storage bag for transfusion. This substance can modify lipid metabolism. This study was aimed to elucidate the metabolic effects of di (2-ethyl hexyl) phthalate medium dose on lipid profi les in serum and liver tissue.

Methods: Sprague Dawley rats were fed 1.0 % di (2-ethyl hexyl) phthalate diet (DEHP group, n=5) or a

non-supplemented diet (control group, n=5) for 10 days. The rats were allowed to freely access each food. Serum lipid concentrations were measured using enzyme assay kits. Lipids of liver tissues were extracted and the lipid contents were determined. A peach of liver was prepared to determine the activities of malic enzyme and carnitine palmitoyl transferase-1 (CPT-1).

Results: Serum lipid concentrations (mg/dL) of DEHP group decreased compared to control (P<0.05). The serum triglyceride (TG) concentrations of control and DEHP groups were respectively (100.5±16.5) and (31.2±1.7); phospholipid (PL), (143.3±7.8) and (88.9±3.2); total cholesterol, (88.7±4.6) and (51.9±2.3). The liver TG content of control and DEHP group (mg/g liver) were respectively, (40.8±4.4) and (23.7±1.3); liver cholesterol were (3.36±0.29) and (2.33±0.23); and the liver PL were (36.5±1.0) and (41.7±0.6). Malic enzyme and CPT-1 activities (nmol/min/ mg protein) of DEHP group increased compared to control (P<0.05), in which their increases were approximately by 4.35- and 2.33-folds, respectively.

Conclusion: The di (2-ethyl hexyl) phthalate medium dose attenuates lipids secretion from the liver cells into the bloodstream. The increase of liver PL level accompanied with the promotions of malic enzyme and the CPT-1 activities are the key factors of the dietary di (2-ethyl hexyl) phthalate effects in rats to attenuate the lipid secretions from the livers