

The differences in metabolic responses between dietary orotate and adenine in lipid profiles of serum and liver tissues

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Abstrak

Tujuan: Menyelidiki perbedaan respons metabolik terhadap asupan diet mengandung orotat dan diet mengandung adenin pada profil lipid dalam serum dan jaringan hati.

Metode: Tikus-tikus percobaan diberi diet yang mengandung orotat 1.0% (kelompok orotat) dan adenin 0.25%

(kelompok adenin) atau diet yang tak disuplementasi (kelompok kontrol) selama 10 hari. Kadar lipid dalam serum

diukur menggunakan enzyme assay kits. Lipid jaringan hati diekstraksi dan konsentrasinya ditentukan.

Hasil: Kadar serum lipid kelompok adenin cenderung meningkat, sebaliknya kelompok orotat cenderung menurun

dibandingkan dengan kelompok kontrol. Kadar serum trigliserida (mg/dL) pada kelompok kontrol, orotat, dan adenin

masing-masing ($78,1 \pm 14,9$), ($69,0 \pm 23,6$), dan ($136,1 \pm 21,6$); Kadar fosfolipid (PL): ($109,2 \pm 11,5$), ($93,3 \pm 10,5$), dan

($131,3 \pm 11,0$); Total kolesterol: ($53,7 \pm 4,6$), ($42,9 \pm 6,5$), dan ($68,1 \pm 5,8$); dan high-density lipoprotein (HDL)-kolesterol:

($35,4 \pm 2,7$), ($33,0 \pm 3,0$), dan ($44,7 \pm 2,7$). Kandungan TG hati pada kelompok orotat meningkat tajam mendekati 10-kali

lipat dibandingkan dengan kelompok kontrol ($P < 0,05$), sebaliknya kandungan TG kedua kelompok lainnya hampir

sama. Kandungan lipid jaringan hati (mg/g jaringan) pada ketiga kelompok dimaksud masing-masing untuk TG

adalah: ($11,4 \pm 1,3$), ($123,5 \pm 15,2$), dan ($11,9 \pm 1,2$); PL: ($27,1 \pm 0,8$), ($25,4 \pm 1,3$), dan ($30,7 \pm 0,6$); dan total kolesterol:

($2,73 \pm 0,09$), ($2,34 \pm 0,12$), dan ($2,91 \pm 0,08$). Kandungan PL dan kolesterol hati pada kelompok adenin masing-masing

meningkat sebesar 21% dan 25% dibandingkan dengan kelompok orotat, tetapi kandungan kedua jenis lipid tersebut

pada kelompok terakhir ini menurun masing-masing sebesar 7% dan 15% dibandingkan dengan kelompok kontrol.

Kesimpulan: Dietary adenin menginduksi sekresi lipid ke dalam aliran darah dan transport balik kolesterol menuju

sel-sel hati. Sebaliknya dietary orotat cenderung mempertahankan lipid-lipid yang telah disintesis di sel-sel hati,

terutama TG, dan mengurangi sekresi.

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Abstract

Aim: Objectives To evaluate the differences in metabolic responses between dietary orotic acid and adenine in lipid

profiles of serum and liver tissues.

Methods: Rats were paired-fed 1.0 % orotic acid (orotic acid group) and 0.25 % adenine (adenine group) diets or a

non-supplemented diet (control group) for 10 days. Serum lipid concentrations were measured using enzyme assay

kits. Lipids of liver tissues were extracted and the lipid contents were determined.

Results: Serum lipid concentrations (in mg/dL) of adenine group tended to increase whereas those levels decreased in

orotic acid group compared to control group. The serum triglyceride (TG) concentrations of control, orotic acid, and

adenine groups were (78.1±14.9), (69.0±23.6), and (136.1±21.6); phospholipids (PL): (109.2±11.5), (93.3±10.5), and

(131.3±11.0); total cholesterol: (53.7±4.6), (42.9±6.5), and (68.1±5.8); and high-density lipoprotein (HDL)-cholesterol:

(35.4±2.7), (33.0±3.0), and (44.7±2.7), respectively. Furthermore, liver TG content of orotic acid group markedly

increased. The increase was approximately by 10-fold in comparison to other groups ($P<0.05$). The lipid contents of

liver tissues (in mg/g tissue) in ordinarily of those three groups for TG were (11.4±1.3), (123.5±15.2), and (11.9±1.2); PL:

(27.1±0.8), (25.4±1.3), and (30.7±0.6); and the total cholesterol: (2.73±0.09), (2.34±0.12), and (2.91±0.08), respectively.

The liver PL and cholesterol content of adenine group increased by 21% and 25% than that of orotic acid group, but both

lipid levels of the latter group increased by 7% and 15%, respectively, than that of the control group.

Conclusion: Dietary adenine enhances the serum TG, PL, cholesterol, and HDL-cholesterol and the liver PL and

cholesterol but without alters the liver TG levels. Dietary orotic acid, however, attenuates these serum lipid levels but

retains those lipids synthesized in liver cells, mainly TG.