Potensi 6-Gingerol dalam Memperbaiki Fungsi Ginjal Tikus Model Sindrom Metabolik = Potency of 6-Gingerol on Ameliorating Renal Function in Metabolic Syndrome Rat Models

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Abstrak

Sindrom metabolik disebabkan oleh pola makan yang tidak sehat seperti diet tinggi lemak, karbohidrat dan fruktosa serta gaya hidup yang menetap. Hal tersebut menyebabkan akumulasi lemak pada berbagai jaringan. Obesitas menyebabkan akumulasi lemak baik di jaringan adiposa dan nonadiposa, salah satunya pada ginjal. Akumulasi lemak yang berlebih pada ginjal menyebabkan disfungsi seluler. Salah satu mekanisme yang menyebabkannya adalah peningkatan stres oksidatif. Tujuan penelitian ini yaitu untuk mengevaluasi efek 6-gingerol terhadap perbaikan fungsi ginjal akibat sindrom metabolik dengan pemberian diet tinggi lemak, fruktosa 55% dan streptozotocin pada tikus. Tikus yang diinduksi menjadi sindrom metabolik (SM) akan diberikan 6-Gingerol dosis 50 mg/kgBB, 100 mg/kgBB dan 200 mg/kgBB selama 8 minggu. Hewan coba dilakukan terminasi setelah 8 minggu pemberian 6-gingerol, lalu dilakukan pengambilan organ, urin dan darah untuk dianalisis parameter ekspresi gen NADPH Oksidase-4 (NOX-4), NADPH Oksidase (NOX-2), P47phox , aktivitas Glutathione peroksidase (GPx), kadar Malondialdehyde (MDA), klirens kreatinin, urea serum, aktivitas N-acetyl-Î²-D glukosaminidase (NAG), kadar protein urin dan histopatologi ginjal dengan pewarnaan Hemaktosilin & Eosin dan Masson trichrome. Hasil dari penelitian ini menunjukkan bahwa pemberian 6-gingerol dosis 100 mg/kgBB dan 200 mg/kgBB dapat menurunkan ekspresi gen NOX-4, P47phox, dan meningkatkan aktivitas GPx walaupun kadar MDA tidak menurun. Pemberian 6-gingerol dosis 200 mg/kgBB dapat meningkatkan klirens kreatinin, menurunkan aktivitas NAG urin dan menurunkan kadar protein urin. 6-Gingerol dosis 100 mg/kgBB dan 200 mg/kgBB dapat menurunkan total akumulasi lemak, menurunkan tubulointetstisial inflamasi dan memperbaiki penebalan membran glomerulus secara histopatologi. Namun tidak dapat menurunkan fibrosis pada tubulointerstisial. Berdasarkan dari hasil penelitian, maka 6-gingerol memiliki potensi dalam memperbaiki kondisi stres oksidatif dan fungsi ginjal pada tikus sindrom metabolik.

.....Metabolic syndrome is caused by unhealthy eating patterns such as high fat, carbohydrates, and fructose diets as well as a sedentary lifestyle. This causes fat accumulation in various tissues. Obesity causes fat accumulation in both adipose and non-adipose tissue, which is the kidneys. Excessive fat accumulation in the kidneys causes cellular dysfunction. One mechanism that causes is increased oxidative stress. This study aimed to evaluate the effect of 6-gingerol on the improvement of kidney function due to metabolic syndrome by administering a high-fat diet, 55% fructose, and streptozotocin to rats. Rats that are induced to develop the metabolic syndrome will be given 6-gingerol at doses of 50 mg/kgBW, 100 mg/kgBW, and 200 mg/kgBW for 8 weeks. The experimental animals were terminated after 8 weeks of 6-gingerol administration, then organs, urine, and blood were taken to determine the gene expression parameters of NADPH Oxidase-4 (NOX-4), NADPH Oxidase (NOX-2), P47phox, Glutathione peroxidase (GPx) activity, Malondialdehyde (MDA) levels, creatinine clearance, serum urea, N acetyl-Î²-D-glucosaminidase (NAG) activity, urine protein levels, and kidney histopathology with Hematoxylin & Eosin and Masson trichrome staining. The results of this study show that administration of 6-gingerol at doses of 100 mg/kgBW and 200

mg/kgBW can reduce the expression of the NOX-4, P47phox genes, and increase GPx activity even though MDA levels do not decrease. Administration of 6-gingerol at a dose of 200 mg/kgBW can increase creatinine clearance, reduce urinary NAG activity, and reduce urinary protein levels. 6- Gingerol at 100 mg/kgBW and 200 mg/kgBW can decrease total fat vacuoles, decrease tubulointerstitial inflammation, and improve histopathological glomerular membrane thickening even though tubulointerstitial fibrosis do not decrease. Based on the research results, 6-gingerol has the potential to improve oxidative stress conditions and kidney function in metabolic syndrome rat.