Efek pemberian nanokurkumin oral pada tikus diabetes yang diinduksi streptozotocin-nikotinamide terhadap progresifitas nefropati melalui hambatan stress oksidatif = The effect of oral nanocurcumin in streptozotocine nicotinamide induced diabetic rat on the progressivity of nephropathy focus on oxidative stress

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Abstrak

Latar Belakang: Hiperglikemia kronik pada diabetes akan menyebabkan peningkatan produksi reactive oxygen species ROS yang berkontribusi terhadap progresifitas nefropati. Kurkumin telah terbukti memiliki khasiat renoprotektif pada nefropati diabetik melalui efek antioksidan. Tetapi, kurkumin memiliki kekurangan yaitu, bioavailabilitas rendah, metabolisme lintas pertama yang ekstensif, dan kelarutan yang buruk. Penelitian ini bermaksud untuk mengetahui efek kurkumin dalam bentuk nanopartikel nanokurkumin terhadap tikus diabetes yang diinduksi Streptozotocine-Nikotinamide terhadap progresifitas nefropati melalui hambatan stress oksidatif.
Metode: Tikus jantan Sprague Dawley diinduksi diabetes melalui pemberian Nikotinamide 100 mg/kg , dilanjutkan dengan Streptozotocine 55 mg/kg , dosis tunggal, intraperitoneal. Kemudian, tikus dibagi menjadi 4 kelompok; normal, DM tanpa treatment, DM treatment kurkumin 100 mg/kg, dan DM treatment nanokurkumin 100 mg/kg, selama 30 hari. Fungsi fisiologis dinilai berdasarkan BB, GDP, dan rasio berat ginjal. Fungsi ginjal dinilai berdasarkan klirens kreatinin, BUN, dan proteinuria. Kerusakan histologis dinilai dari scoring pewarnaan HE. Stress oksidatif diukur dari kadar malondialdehyde MDA dan kadar superoxide dismutase SOD.
Hasil: Meski tidak signifikan, pemberian nanokurkumin menunjukkan efek yang lebih baik daripada pemberian kurkumin berdasarkan parameter SOD, GDP, berat badan, rasio berat ginjal, klirens kreatinin, protein urin, dan gambaran histopatologi. Pemberian nanokurkumin secara signifikan menurunkan kadar BUN.
Kesimpulan: Setelah 30 hari pemberian nanokurkumin 100 mg/kg BB maupun kurkumin dengan dosis sama tidak dapat menurunkan stress oksidatif, namun dapat mencegah progresifitas nefropati diabetikum.
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Background: Chronic hyperglycaemia in diabetes leads to the overproduction of reactive oxygen species ROS that these contribute to the development of diabetic nephropathy. Curcumin, has been recently discovered to have renoprotective effects on diabetic nephropathy DN through its antioxidant properties. However, low peroral bioavailability, extensive first pass metabolism, and low solubility is a major limiting factor for the success of clinical utilization of curcumin. The present study was undertaken to examine the effect of curcumin formed in nanoparticles nanocurcumin treatment in Streptozotocine Nicotinamide induced diabetic rat on the progressivity of nephropathy through its stress oxidative inhibition.
Method: Diabetes was induced by Nicotinamide 100 mg kg followed by Streptozotocine 55 mg kg, single dose, intraperitoneal, in male Sprague Dawley rats. Then rats divided into four groups, namely normal, diabetic, diabetic treated with curcumin 100 mg kg, and diabetic treated with nanocurcumin 100 mg kg for 30 days. Physiological function was assessed by body weight, FBG, and kidney weight ratio. Renal function

was assessed by creatinine clearance, BUN, and proteinuria. Diabetic renal damage was determined by Hematoxyclin Eosin HE staining. Oxidative stress was measured by renal malonaldehyde MDA level, and superoxide dismutase SOD level.
Result: Although did not significant, nanocurcumin showed better effect than curcumin based on SOD, FBG, body weight, kidney weght ratio, creatinine clearance, proteinuria, and renal histopathological changes. Nanocurcumin showed significant decreases in BUN level.
Conclusion: After 30 days of treatment, both nanocurcumin and curcumin 100 mg kg did not decreases oxidative stress but showed inhibition in progressivity of nephropathy.