

Efek pemberian nanokurkumin oral terhadap stres oksidatif pada jantung tikus diabetes yang di induksi dengan streptozotocin-nicotinamide = The effects of oral nanocurcumin on cardiac oxidative stress in streptozotocin nicotinamide induced diabetic rat

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Abstrak

ABSTRAK

Latar Belakang: Komplikasi diabetes pada jantung dapat terjadi oleh karena produksi reactive oxygen spesies (ROS) berlebih. Beberapa studi menunjukkan stres oksidatif berperan dalam patogenesis komplikasi diabetes seperti kardiomiopati. Kurkumin telah terbukti memiliki khasiat sebagai antioksidan dan kardioprotektif. Tetapi kurkumin memiliki bioavailabilitas yang rendah didalam tubuh. Oleh karena itu kurkumin dibuat dalam bentuk nanokurkumin. Penelitian ini bertujuan untuk mengetahui pengaruh nanokurkumin terhadap stres oksidatif pada jantung tikus yang di induksi diabetes.

Metode: Tikus Sprague-Dawley jantan di induksi diabetes dengan nikotinamide (NA) 100 mg/kgBB dan streptozotocin (STZ) 55 mg/kgBB secara intraperitoneal dan dosis tunggal. Terdapat 4 kelompok tikus antara lain, kelompok normal (tikus yang tidak di induksi), kelompok kontrol diabetes (CMC 0,5%), kelompok tikus diabetes yang diberi kurkumin oral 100mg/kg/hari dan kelompok tikus diabetes yang diberi nanokurkumin oral 100mg/kg/hari. Pengamatan dilakukan selama 30 hari. Kadar glukosa darah, aktivitas enzim creatine kinase myocardial band (CKMB), kadar malondialdehid (MDA), aktivitas enzim superoksida dismutase (SOD), glutathion peroksidase (GPx) dan histopatologi otot jantung dianalisis dengan statistik menggunakan uji ANOVA, perbedaan dianggap bermakna secara statistik bila $p < 0.05$.

Hasil: Pemberian nanokurkumin dan kurkumin tidak mempengaruhi kadar glukosa darah dan cenderung menurunkan aktivitas CKMB pada serum. Nanokurkumin menurunkan kadar MDA jantung. Selain itu, nanokurkumin dan kurkumin dapat meningkatkan aktivitas enzim GPx tetapi tidak mempengaruhi aktivitas enzim SOD. Kurkumin memperbaiki kerusakan otot jantung dan lebih baik dibanding nanokurkumin.

Kesimpulan: Hasil penelitian ini menunjukkan bahwa induksi diabetes dan pengamatan selama 30 hari belum memicu kondisi stres oksidatif yang nyata. Nanokurkumin tidak mampu memperbaiki kerusakan otot jantung tetapi mempunyai efek menekan kadar MDA dan meningkatkan aktivitas GPx.

ABSTRACT

Background: Complications of diabetic in the heart may occur due to the excess production of reactive oxygen spesies (ROS). Previous studies showed that oxidative stress played a role in the pathogenesis of diabetic complications such as cardiomyopathy. Curcumin has potential and efficacy as an antioxidant and cardioprotective agent. However, curcumin has low bioavailability in the body. In the present study we investigate the effects of curcumin in the form of nanocurcumin against oxidative stress in the heart from streptozotocinnicotinamide- induced diabetic rats.

Methods: Sprague-Dawley rats were induced diabetes with nicotinamide 100mg/kg and streptozotocin 55 mg/kg intraperitoneally. Rats were divided into nondiabetic group, diabetic control group (CMC 0,5 %) and two treated groups which were orally given curcumin at a dose of 100 mg/kg/day and nanocurcumin at a dose of 100 mg/kg/day, respectively. After 30 days of observation, the blood glucose levels, activity of the enzyme creatine kinase myocardial band (CKMB), levels of malondialdehyde (MDA), activity of the enzyme superoxide dismutase (SOD), glutathione peroxidase (GPx) and histopathology of the heart muscle were analyzed and the data were assessed using ANOVA test with the level of significance of $p < 0.05$.

Results: Nanocurcumin and curcumin did not decrease blood glucose levels and tended to reduce the activity of CKMB in serum. Nanocurcumin reduced cardiac MDA. Nanocurcumin and curcumin enhanced the activity of GPx enzyme, but did not influence the activity of SOD enzyme. Curcumin appeared to be able to repair injured heart muscle and was better than nanocurcumin.

Conclusion: The results of study indicate that induction of diabetes by streptozotocin-nicotinamide did not result in severe oxidative stress in the rats. Nanocurcumin is not able to repair injured heart muscle but could suppress MDA levels and increase the activity of GPx.