Effect of Nanoparticle Size of Curcumin on its Concentration on the Rat Liver = Efek ukuran nanopartikel kurkumin terhadap konsentrasi kurkumin pada hati tikus

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Abstrak

Latar Belakang: Berbagai penelitian terdahulu telah membuktikan bahwa kurkumin memiliki sifat hepatoprotektif sehingga memungkinkannya untuk mengobati banyak jenis penyakit hepar. Meskipun kurkumin aman dan mempunyai banyak aktifitas biologis, penggunaan kurkumin belum dapat digunakan secara komersil sebagai obat terapeutik karena tingkat absorbsi, stabilitas, dan bioavailabilitas yang rendah serta metabolisme kurkumin yang cepat. Berhubung studi mengenai efek pengurangan ukuran partikel untuk meningkatkan distribusi jaringan belum dilakukan sepenuhnya, penelitian ini bertujuan untuk mengetahui apabila peningkatan konsentrasi kurkumin di jaringan hepar dapat dilakukan dengan menggunakan nanopartikel.Metode: Penelitian ini merupakan penelitian in vivo pada tikus. Tikus dirandomisasi menjadi 2 kelompok, masing-masing 5 ekor yang mendapatkan kurkumin konvensional 500 mg/kgBB atau nanokurkumin 500 mg/kgBB dosis tunggal secara oral. Sampel hati diambil setelah 3 atau 4 jam setelah pemberian obat dan konsentrasi kurkuminnya dikuantifikasi menggunakan UPLC-MS/MS.Hasil: Konsentrasi nanokurkumin lebih tinggi daripada konsentrasi kurkumin konvensional di jaringan hepar setelah 3 jam dan relatif lebih tinggi setelah 4 jam. Pada 3 jam, konsentrasi rerata nanokurumin (33.1934 ng/mg) adalah lebih dari 7 kali lipat dibandingkan konsentrasi rerata kurkumin (4.5189 ng/mg) dan bermakna secara statistik (p = 0.047). Pada 4 jam, konsentrasi rerata nanokurumin (11.8725 ng/mg) hanya sedikit lebih tinggi dibandingkan konsentrasi rerata kurkumin (11.6352 ng/mg) dan tidak bermakna secara statistik (p = 0.251).Konklusi: Pemberian nanokurkumin secara oral menghasilkan konsentrasi kurkumin yang lebih tinggi di hati tikus setelah 3 dan 4 jam daripada kurkumin konvensional.

Background: Many previous researches have proven that curcumin possesses potent hepatoprotective propertiy which enables it to treat and prevent the progression of different hepatic disorders. However, despite its superior safety profile and biological activity, curcumin has not been commercially used as a therapeutic drug due to its extremely poor absorption and stability, low bioavailability and rapid metabolism. As the effect of decreasing its particle size to improve its tissue distribution have yet to be studied thoroughly, this research aims to find out if higher curcumin concentrations in liver tissue can be achieved by using nanoparticles.Method: This research is an in vivo research in rats. The rats are randomized into 2 groups, each with 5 rats which were given either single doses of 500 mg/kgBW conventional curcumin or 500 mg/kgBW nanocurcumin orally. The liver samples were obtained after 3 or 4 hours, followed by curcumin concentration measurement using the UPLC-MS/MS method.
Results: Nanocurcumin concentrations were higher than curcumin concentrations in the liver tissue at 3 hours and relatively higher at 4 hours. At three hours, the mean nanocurcumin concentration (33.1934 ng/mg) is over 7 times higher than mean curcumin concentration (4.5189 ng/mg) and is statistically significant (p = 0.047). At 4 hours, the mean nanocurcumin concentration (11.8725 ng/mg) is slightly higher

than mean curcumin concentration (11.6352 ng/mg) not statistically significant (p = 0.251)Conclusion: Oral administration of nanocurcumin results in higher curcumin concentrations in rat liver tissue after 3 and 4 hours compared to conventional curcumin.