Efektivitas mangiferin dalam Nanopartikel Kitosan-Alginat sebagai Pengikat Fe untuk mencegah Hemosiderosis pada Tikus = Effectiveness of Mangiferin in Chitosan-Alginate Nanoparticles as an Iron Chelator for The Prevention of Hemosiderosis in Rat.

Deby Jannati Gustiwi, author

Abstrak

ABSTRAK
Latar Belakang: Mangiferin diketahui memiliki aktivitas sebagai agen pengikat besi, namun pemberian mangiferin melalui oral memiliki bioavailabilitas yang rendah. Sistem hantaran dengan nanopartikel diharapkan dapat meningkatkan bioavailabilitas dan efektivitas mangiferin. Penelitian bertujuan menguji efektivitas mangiferin nanopartikel kitosan-alginat dalam menurunkan kadar besi di plasma dan organ, kadar ferritin, transferrin, SGOT dan SGPT.
Metode: Penelitian menggunakan desain eksperimental in vivo dengan hewan coba tikus Sprague-Dawley dibagi dalam 5 kelompok, yaitu kelompok normal, kelebihan besi, terapi mangiferin 50 mg/KgBB, terapi mangiferin dalam nanopartikel kitosanalginat 25 mg/KgBB, dan terapi mangiferin dalam nanopartikel kitosan-alginat 50 mg/KgBB. Pengukuran kadar Fe plasma, hati dan jantung, kadar Ferritin, kadar Transferrin, dan nilai aktivitas SGPT dan SGOT.
Hasil: Kadar besi plasma, besi hati dan jantung, ferritin, dan transferrin pada kelompok kelebihan besi adalah 45,52 mg/L; 3661,98 μg/gram; 1734,4 μg/gram; 3578,16 ng/mL; 388,96 μg/dL, sedangkan pemberian terapi mangiferin 50 mg/KgBB ($p < 0,05$) menghasilkan 5,17 mg/L; 1572,96 μg/gram; 776,68 μg/gram; 1136,51 ng/mL; 272,18 μg/dL, pemberian terapi mangiferin dalam nanopartikel kitosan-alginat 25 mg/KgBB ($p < 0,05$) menghasilkan 5,74 mg/L; 1090,01 μg/gram; 753,90 μg/gram; 520,89 ng/mL; 231,97 μg/dL, pemberian terapi mangiferin dalam nanopartikel kitosan-alginat 50 mg/KgBB ($p < 0,05$) menghasilkan 3,34 mg/L; 1703,92 μg/gram; 759,2 μg/gram; 559,48 ng/mL; 235,70 μg/dL. Tidak terdapat perbedaan bermakna antar kelompok terhadap nilai aktivitas SGOT dan SGPT
Kesimpulan: Mangiferin dalam nanopartikel kitosan-alginat efektif menurunkan kadar besi, ferritin, transferrin plasma, dan kadar besi di organ hati dan jantung, namun tidak menurunkan nilai aktivitas SGOT dan SGPT. Efektivitas mangiferin dalam nanopartikel kitosan-alginat tidak berbanding lurus dengan dosis.
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ABSTRACT
Background: Mangiferin was known to have activity as an iron-chelating agent, but oral administration of mangiferin has poor bioavailability. Nanoparticles delivery system is expected to increase bioavailability and effectiveness of mangiferin. This study aims to examine the effectiveness of mangiferin in chitosanalginate nanoparticles in reducing iron levels in plasma and organs, ferritin, transferrin, SGOT and SGPT activities.
Methods: This is an in vivo experimental study using Sprague-Dawley rats, divided into 5 groups, normal, iron overload, mangiferin 50mg/KgBW, mangiferin in chitosan-alginate nanoparticles 25mg/KgBW, and

mangiferin in chitosanalginate nanoparticles 50mg/KgBW. Fe levels were measured in plasma, liver and heart. In addition ferritin levels, transferrin levels, and SGPT and SGOT activities also measure at day 29th. Results: Plasma iron levels, liver and heart iron levels, ferritin, and transferrin in the iron overload group were 45.52 mg/L; 3661.98 μg/gram; 1734.4 μg/gram; 3578.16 ng/mL; 388.96 μg/dL, treatment with mangiferin 50 mg/KgBW ($p < 0.05$) reduced those parameters to 5.17 mg/L; 1572.96 μg/gram; 776.68 μg/gram; 1136.51 ng/mL; 272.18 μg/dL, treatment with mangiferin in chitosan-alginate nanoparticles 25 mg/KgBW ($p < 0.05$) reduced those parameters 5.74 mg/L; 1090.01 μg/gram; 753.90 μg/gram; 520.89 ng/mL; 231.97 μg/dL, treatment with mangiferin in chitosan-alginate nanoparticles 50 mg/KgBW ($p < 0.05$) reduced those parameters 3.34 mg/L; 1703.92 μg/gram; 759.2 μg/gram; 559.48 ng/mL; 235.70 μg/dL. There is no significant difference in SGOT and SGPT activities. Conclusions: Mangiferin in chitosan-alginate nanoparticles was effective in preventing the increase of iron, ferritin, transferrin plasma levels, and iron levels in the liver and heart, but not prevent the increasing of SGOT and SGPT. The effectiveness of mangiferin in chitosan-alginate nanoparticles is not directly proportional to the dose.