Potensi Neoagaro-oligosakarida Terhadap Perbaikan Kerusakan Hepar Mencit (Mus musculus Linnaeus,
1758) Diabetes Mellitus Tipe 2
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# POTENSI NEOAGARO-OLIGOSAKARIDA TERHADAP PERBAIKAN KERUSAKAN HEPAR MENCIT (*Mus musculus* Linnaeus, 1758) DIABETES MELLITUS TIPE 2

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## INTISARI

Diabetes mellitus tipe 2 merupakan penyakit metabolik kronis ditandai resistensi insulin dan hyperglikemia yang dapat mengakibatkan kerusakan hepar akibat hiperglikemia kronis, stres oksidatif, inflamasi, dan lipotoksisitas.Neoagaro-oligosakarida (NAOS) merupakan senyawa bioaktif hasil hidrolisis agarosa, diketahui memiliki aktivitas hepatoprotektif dalam mereduksi akumulasi lemak melalui aktivasi AMPK serta penekanan jalur lipogenesis SREBP-1c, meskipun pengaruh terhadap hepar pada kondisi diabetes mellitus tipe 2 masih belum banyak dikaji. Berdasarkan hal itu, penelitian ini bertujuan mempelajari potensi NAOS dalam melalui menurunkan kadar glukosa dalam darah, menghambat kerusakan hepar melalui penurunan SGPT, memperbaiki profil histopatologi.Penelitian eksperimental ini menggunakan 25 ekor mencit jantan galur Balb/c yang diinduksi diet tinggi lemak dan streptozotocin, kemudian dibagi menjadi enam kelompok, yaitu kontrol, kontrol sakit tanpa perlakuan, kontrol pemberian metformin 0,5 mg/kg/BB, serta NAOS dosis 100, 200, dan 400 mg/KgBB yang diberikan secara oral, dengan parameter glukosa darah, skor histopatologi, dan aktivitas SGPT dianalisis menggunakan SPSS. Hasil menunjukkan bahwa perlakuan berbagai dosis NAOS secara signifikan menurunkan kadar glukosa dalam darah dengan efektivitas tertinggi pada dosis 200 mg/KgBB rerata (73,5 ± 16,8 mg/dL) dan 400 mg/kgBB yaitu (109,0 ± 5 mg/dL).Pemberian NAOS dalam semua dosis belum menurunkan kadar SGPT secara signifikan secara statistik akibat keterbatasan jumlah sampel, Gambaran histopatologi menunjukkan perbaikan susunan pada pemberian NAOS 100 ,200 dan 400 mg/kgBB ditandai dengan penurunan persentase steatosis (0,12% ± 2,5 %) dan nekrosis (23,7% ± 5 %) yang signifikan. Pemberian NAOS pada mencit model diabetes melitus tipe 2 secara signifikan menurunkan kadar glukosa darah (optimal pada dosis 200 dan 400 mg/kgBB) dan memperbaiki gambaran histopatologi hepar pada seluruh dosis, ditandai penurunan steatosis dan nekrosis, meskipun belum menurunkan kadar SGPT secara bermakna.

Kata kunci: diabetes mellitus tipe 2, histopatologi, Neoagaro-oligosakarida, steatosis, SGPT.

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# POTENTIAL OF NEOAGARO-OLIGOSACCHARIDES IN IMPROVING LIVER DAMAGE IN TYPE 2 DIABETES MELLITUS INDUCED MICE (*Mus musculus* Linnaeus, 1758)

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## ABSTRACT

Type 2 diabetes mellitus is a chronic metabolic disease characterized by insulin resistance and hyperglycemia, which can lead to liver damage through chronic hyperglycemia, oxidative stress, inflammation, and lipotoxicity.. Neoagaro-oligosaccharide (NAOS), a bioactive compound derived from agarose hydrolysis, has been reported to exhibit hepatoprotective activity by reducing lipid accumulation through AMPK activation and suppression of the SREBP-1c lipogenic pathway; however, its effect on the liver under conditions of type 2 diabetes mellitus accompanied by NAFLD remains poorly investigated. Accordingly, this study aimed to evaluate the potential of NAOS in reducing blood glucose levels, inhibiting hepatic damage through reduction of serum glutamic pyruvic transaminase (SGPT), and improving histopathological profiles. This experimental study employed 25 male Balb/c mice induced with a high-fat diet and streptozotocin, subsequently divided into six groups: normal control, untreated diseased control, positive control receiving metformin (0.5 mg/kgBW), and NAOS treatment groups at doses of 100, 200, and 400 mg/kgBW administered orally. Blood glucose levels, histopathological scores, and SGPT activity were analyzed using SPSS. The results showed that NAOS administration at various doses significantly reduced blood glucose levels, with the highest efficacy observed at doses of 200 mg/kgBW (mean 73.5 ± 16.8 mg/dL) and 400 mg/kgBW (109.0 ± 5 mg/dL). NAOS administration at all doses did not significantly reduce SGPT levels, likely due to the limited sample size. Histopathological examination revealed structural improvement following NAOS administration at doses of 100, 200, and 400 mg/kgBW, marked by a significant reduction in the percentage of steatosis (0.12% ± 2.5%) and necrosis (23.7% ± 5%). Overall, NAOS administration in mice with type 2 diabetes mellitus significantly reduced blood glucose levels (optimal at doses of 200 and 400 mg/kgBW) and improved hepatic histopathological features across all doses, as indicated by reduced steatosis and necrosis, although it did not significantly reduce SGPT levels.

Keywords: type 2 diabetes mellitus, histopathologi, steatosis, SGPT, Neoagaro-oligosaccharide.