ABSTRAK

Penelitian ini bertujuan untuk menguji dan menganalisis efektivitas sediaan nanoemulsi ekstrak bunga lawang (*Illicium verum*) terhadap penurunan kadar malondialdehida (MDA), kadar glukosa darah (KGD), serta perbaikan gambaran histopatologi hati pada tikus putih (*Rattus norvegicus*) galur Wistar jantan yang diinduksi aloksan. Sebanyak 26 ekor tikus jantan dengan berat 160–200 g dan umur 2–3 bulan digunakan sebagai sampel, dibagi menjadi empat kelompok masing-masing enam ekor, dan diberi perlakuan selama 21 hari: (a) Kontrol Negatif (K-0), diberi aquades; (b) Kontrol Negatif (K-1), diinduksi aloksan dan diberikan metformin; (c) Perlakuan-1 (K-2), diinduksi aloksan dan diberi nanoemulsi ekstrak bunga lawang 10%; serta (d) Perlakuan-2 (K-3), diinduksi aloksan dan diberi nanoemulsi ekstrak bunga lawang 20%. Uji fitokimia menunjukkan bahwa ekstrak bunga lawang mengandung flavonoid, saponin, alkaloid, tannin, dan triterpenoid yang berperan sebagai antioksidan, antiinflamasi, dan pelindung sel. Pemberian nanoemulsi ekstrak bunga lawang konsentrasi 20% mampu menurunkan KGD secara signifikan hingga mendekati kelompok kontrol negatif ($p = 0{,}333$) serta menurunkan kadar MDA secara bermakna melalui mekanisme penangkapan radikal bebas. Selain itu, penurunan kadar ALT dan AST pada kelompok perlakuan 20% menunjukkan perbaikan fungsi hati yang terganggu akibat stres oksidatif. Analisis histopatologi mengungkap bahwa kelompok perlakuan 20% hanya menunjukkan kerusakan jaringan minimal, berbeda dengan kelompok perlakuan 10% yang mengalami kerusakan lebih luas. Hasil ini menunjukkan bahwa nanoemulsi ekstrak bunga lawang konsentrasi 20% memiliki potensi protektif terhadap kerusakan hati dan efektif menurunkan kadar glukosa serta stres oksidatif pada model tikus diabetes.

ABSTRACT

This study aimed to evaluate and analyze the effectiveness of nanoemulsion preparations of star anise (Illicium verum) extract in reducing malondialdehyde (MDA) levels, blood glucose levels (BGL), and improving liver histopathological features in male Wistar rats (Rattus norvegicus) induced with alloxan. A total of 26 male rats weighing 160–200 g and aged 2–3 months were used as samples, divided into four groups of six rats each, and treated for 21 days: (a) Negative Control (K-0), given distilled water; (b) Positive Control (K-1), induced with alloxan and administered metformin; (c) Treatment-1 (K-2), induced with alloxan and given 10% nanoemulsion of star anise extract; and (d) Treatment-2 (K-3), induced with alloxan and given 20% nanoemulsion of star anise extract. Phytochemical analysis showed that the star anise extract contained flavonoids, saponins, alkaloids, tannins, and triterpenoids, which act as antioxidants, anti-inflammatory agents, and cytoprotective compounds. Administration of 20% nanoemulsion of star anise extract significantly reduced BGL to levels approaching the negative control group ($p = 0.333$) and significantly decreased MDA levels through a free radical scavenging mechanism. Furthermore, reductions in ALT and AST levels in the 20% treatment group indicated improvement in liver function impaired by oxidative stress. Histopathological analysis revealed that the 20% treatment group exhibited only minimal tissue damage, in contrast to the 10% treatment group, which showed more extensive damage. These findings indicate that the 20% nanoemulsion of star anise extract has protective potential against liver damage and is effective in reducing blood glucose levels and oxidative stress in a diabetic rat model.