AKTIVITAS ANTI-LIPASE DAN ANTI-HIPERTRIGLISERIDEMIA DARI KOMBINASI EKSTRAK TERSTANDAR DAUN KEMUNING DAN DAUN ASAM JAWA PADA TIKUS WISTAR MODEL HIPERLIPIDEMIA

ABSTRAK

Latar belakang
Non-alcoholic fatty liver diseases (NAFLD) dan resistensi insulin disebutkan berkaitan erat dengan hiperlipidemia tinggi trigliserida (hipertrigliseridemia, HTG). Sementara obat pilihan untuk HTG seperti statin, niasin, dan fibrat masih memberikan efek samping merugikan antara lain miopati dan rhabdomiolisis. Daun kemuning (*Murraya paniculata*) secara empiris telah digunakan sebagai penurun lipid, sedangkan daun asam (*Tamarindus indica*) dilaporkan mengandung antioksidan yang tinggi.
Tujuan
Penelitian ini bertujuan untuk mengevaluasi kombinasi ekstrak terstandar daun kemuning dan daun asam jawa untuk menurunkan kadar trigliserida pada hewan model hipertrigliseridemia secara *in vitro* dan *in vivo*, serta mengetahui aktivitas proteksi terhadap hepar dan pankreas terkait hiperlipidemia.
Metode
Kombinasi ekstrak terstandar diuji secara *in vitro* dalam menghambat enzim pankreatik lipase, sedangkan pada uji *in vivo* digunakan tikus Wistar model hiperlipidemia yang dibuat dengan pemberian diit lemak tinggi dan fruktosa selama 75 hari. Kombinasi ekstrak dibuat mengikuti desain eksperimen *Simplex Lattice Design* (SLD) dengan lima variasi komposisi (50-350, total 400 mg/kgBB). Ekstrak diberikan ke hewan coba secara oral 1x/hari selama 14 hari.
Hasil
Aktivitas penghambatan lipase ekstrak daun asam jawa lebih kuat daripada kemuning. Namun aktivitas anti-lipase kombinasi ekstrak tampak tidak lebih kuat daripada ekstrak tunggal. Hasil pengukuran profil lipid menunjukkan pada kombinasi daun asam:kemuning (350:50 mg/kgBB) paling signifikan menurunkan kadar trigliserida dan menghambat kenaikan berat badan paling baik. Pengukuran kadar gula darah menunjukkan pada kombinasi ini efek hipoglikemiknya lebih baik dibandingkan kombinasi lainnya berdasarkan analisis SLD. Aktivitas proteksi terhadap jaringan hepar dimiliki oleh semua kelompok kombinasi yang ditunjukkan dengan kenaikan enzim katalase dan penurunan MDA dibandingkan dengan kelompok HTG ($p>0,05$). Kombinasi ekstrak dengan proporsi daun kemuning yang tinggi memberikan proteksi pankreas lebih baik, yang dilihat dari pemeriksaan histopatologi.
Kesimpulan
Pemberian kombinasi ekstrak terstandar daun kemuning dan daun asam jawa mampu menurunkan status hipertrigliseridemia pada tikus model hiperlipidemia dengan kombinasi optimum dicapai pada perbandingan 314:86 (daun asam:kemuning, dalam mg/kgBB).

Kata kunci: anti-hipertrigliseridemia, kemuning, daun asam jawa, ekstrak terstandar

THE ANTI-LIPASE AND ANTI-HYPERTRIGLYCERIDEMIC ACTIVITY OF THE COMBINATION OF STANDARDIZED LEAVES EXTRACT FROM *Tamarindus indica* AND *Murraya paniculata* IN HYPERLIPIDEMIC WISTAR RAT MODEL

ABSTRACT

Introduction
Non-alcoholic fatty liver disease (NAFLD) and insulin resistance are said to be closely related to high triglyceride hyperlipidemia (HTG). Meanwhile, the drugs of choice for HTG, such as statins, niacin, and fibrates, still have adverse side effects, including myopathy and rhabdomyolysis. *Kemuning* leaves (*M. paniculata*) have been empirically used for lowering lipids, while tamarind leaves (*T. indica*) are reported to contain high antioxidants.
Objectives
This study aims to evaluate the combination of standardized extracts of *kemuning* leaves and tamarind leaves to reduce triglyceride levels in animal models of hypertriglyceridemia *in vitro* and *in vivo*, and to determine the protective activity in the liver and pancreas related to hyperlipidemia.
Methods
The combination of standardized extracts was tested *in vitro* to inhibit the pancreatic lipase enzyme, while in the *in vivo* test Wistar rats were used as a model for hyperlipidemia which was prepared by giving a high fat diet and fructose for 75 days. The combination of extracts was made following the Simplex Lattice Design (SLD) experimental design with five composition variations (50-350, a total of 400 mg/kg BW). The extract was given to experimental animals orally 1x/day for 14 days.
Results
The lipase inhibitory activity of tamarind leves extract was stronger than *kemuning* leaves. However, the anti-lipase activity of the combined extracts did not appear to be stronger than that of the single extracts. The results of lipid profile measurements showed that the combination of tamarind:*kemuning* leaves (350:50 mg/kg BW) significantly reduced triglyceride levels and inhibited weight gain the best. Measurement of blood sugar levels showed that this combination had a better hypoglycemic effect than other combinations based on SLD analysis. The protective activity against liver tissue took place in all combination groups as indicated by an increase in the catalase enzyme and a decrease in MDA as compared to the HTG group ($p>0.05$). Administration of the combined extract with a high proportion of *kemuning* leaves provided better pancreatic protection, as seen from histopathological examination.
Conclusion
Administration of the combination of standardized extracts of *kemuning* leaves and tamarind leaves was able to reduce hypertriglyceridemia status in hyperlipidemic rats with the optimum combination achieved at a ratio of 314:86 (tamarind:*kemuning* leaves, in mg/kg BW)

Keywords: anti-hypertriglyceridemia, *kemuning*, tamarind leaf, standardized extract