Pembuatan ekstrak pengeringan beku jamu serbaguna dengan pelarut air dan etanol: pengujian in silico aktivitas anti-hiperglikemik = Synthesis of freeze-dried multifunction herbs extract in water and ethanol solvent: in silico testing of anti-hyperglycemic activity

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Abstrak

Peningkatan kadar gula darah (hiperglikemia) pada penyakit diabetes melitus dapat dibantu dikurangi dengan mengonsumsi jamu serbaguna. Penelitian ini bertujuan untuk memperoleh kondisi operasi ekstraksi yang optimal serta pengujian in silico dari ekstrak jamu serbaguna yang berbahan dasar rimpang temulawak (Curcuma xanthorriza L.), daun belimbing manis (Averrhoa carambola L.), dan daun tanjung (Mimusops elengi L.). Penelitian diawali dengan proses ekstraksi refluks simplisia jamu serbaguna dengan variasi rasio pelarut air dan etanol yang dikeringkan dengan dua metode yang berbeda yaitu oven (60oC) dan beku (-50oC). Hasil ekstraksi diuji kandungan fitokimia (xantorizol, asam fenilasetat dan asam oleat) dengan Gas Chromatography-Mass Spectrometry, dilakukan simulasi interaksi fitokimia jamu serbaguna terhadap protein penyebab hiperglikemik (11-beta-hidroksisteroid dehidrogenase-1; interleukin-1-beta; dan protein tirosin fosfat), serta dilakukan pemodelan reaksi enzimatik untuk meninjau kemampuan inhibisi antara komponen fitokimia jamu serbaguna dengan protein penyebab hiperglikemia. Hasil penelitian menunjukkan konsentrasi fitokimia tertinggi dihasilkan pada suhu 70oC dengan pelarut etanol 75% selama 45 menit. Hasil penelitian menggunakan program Molecular Operating Environment (MOE) 2014.09 menunjukkan adanya interaksi inhibisi dari kandungan fitokimia jamu serbaguna terhadap protein penyebab hiperglikemik. Pemodelan reaksi enzimatik inhibisi non-kompetitif berbasis kedua hasil penelitian tersebut menunjukkan perkiraan besar kemampuan inhibisi setiap fitokimia dan obat standar (Metformin) terhadap protein penyebab hiperglikemik.

.....Increased blood sugar levels (hyperglycemia) in diabetes mellitus can be helped to decrease by consuming multipurpose herbs. This research aimed to obtain the optimum operating conditions for extraction and in silico testing of a multifunction herbs extract made from temulawak rhizome (Curcuma xanthorriza L.), sweet star fruit (Averrhoa carambola .) leaves, and tanjung (Mimusops elengi L.) leaves. The research began with the reflux extraction process of multifunction herbs simplicia in various solvent ratios of water and ethanol which was dried using two different methods, namely oven (60oC) and freeze dry (-50oC). The extracted bioactive substances (xanthorrhizol, phenylacetic acid, and oleic acid) were examined using Gas Chromatography-Mass Spectrometry, proceeded with simulation of the interaction of multifunction herbs bioactive substance to hyperglycemic-causing proteins (11-beta-hydroxysteroid dehydrogenase-1; interleukin-1-beta; and protein tyrosine phosphate), and followed by non-competitive inhibition enzymatic reactions modelling to review the inhibitory activity between multifunction herbs bioactive substances and hyperglycemic-causing proteins. The results showed that the highest concentration of bioactive substances was produced at a temperature of 70oC in 75% ethanol solvent for 45 minutes. Analysis using Molecular Operating Environment (MOE) 2014.09 showed inhibition interactions of multifunction herbs bioactive substances on hyperglycemic-causing proteins. The non-competitive inhibitory enzymatic reactions modelling showed a large estimate of the inhibitory activities from each

active substance and standard drug (Metformin) against hyperglycemic-causing proteins.