Bioproduksi senyawa kimia aktif antidiabetes oleh Kapang Endofit dari tanaman obat Indonesia = Bioproduction of antidiabetic active compounds by Endophytic Fungi of Indonesia medicinal plants

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Abstrak

Forty-five isolates of endophytic fungi from six Indonesian medicinal plant stems such as sambiloto (Andrographis paniculata [Burm.f.] Ness), kumis kucing (Orthosiphon aristatus [Blume] Miq), mengkudu (Morinda citrifolia L), sirih merah (Piper crocatum Ruiz & Pav), sirih hitam (Piper betle L), mahoni (Swietenia macrophylla King) have been isolated and screened. Fermentation was conducted over 14 days by using the media Potato Dextrose Broth (PDB).The product of fermentation process was extracted with ethyl acetate. The antidiabetic assay was performed using α-glucosidase test. The isolates A.Ap.3F, A.Ap.4F, B.Ap.4F, B.Os.1F, A.Pc.1F, B.Pc.1F and B.Pc.2F showed antidiabetic activity. The antioxidant performed using 1,1-diphenyl-2-picrylhidrazyl (DPPH) free radical scavenging method. The isolates A.Ap.3F, B.Ap.1F, B.Pc.1F have the antioxidant activity compare vitamin C as a control. Isolates A.Ap.3F by IC50 31,45 ppm, isolates B.Ap.1F by IC50 86,29 ppm and isolates B.Pc.1F by IC50 95,46 ppm. Identification of endophytic fungi A.Ap.3F done microscopically. Molecular identification A.Ap.3F endophytic fungi is Colleotrichum truncatum strain PDC032. Fermentation of A.Ap.3F isolates is carried out using 2 methods; static fermentation and dynamic fermentation. The results shown that with static fermentation method produced 0.19 g (9.5%) of mass of filtrate and biomass weight 0.56 g(28%); and with dynamic fermentation produced mass of filtrate 0.68 g (34.17%) and bomass weight 0.77 g (38.50%). Separation results bioproduction A.Ap.3F endophytic fungi by column chromatography obtained five fractions. GCMS analysis of the fraction I consist of three fatty acids are hexadecanoid acid, 9-octadecenoic acid and 9,12-octadecadienoic acid. Analysis of 1H NMR, 13C NMR, DEPT, COSY, HMQ, HMBC and GCMS that isolates II-3 from fraction II obtained from fraction II-3 II are compounds octadecanoic acid [C18H34O2]. GCMS analysis suggested that isolates III-2 fraction III is a compound with m / z = 256.1 and m / z = 282.. GCMS analysis suggested that isolates IV-3- fraction IV are compound with m / z = 256.1 and m / z = 282 and isolates V-6-fraction V is a compound with m / z = 221, m/z =256, m/z=282 and m / z = 346. Inhibitory activity against α-glucosidase were highest for isolates III-2-fraction II by 85.45% and isolates IV-3-fractions IV by 87.72%.
<hr>Isolasi dan skrining kapang endofit dari batang 6 tanaman obat Indonesia seperti, sambiloto (Andrographis paniculata [Burm.f.] Ness), kumis kucing (Orthosiphon aristatus [Blume] Miq), mengkudu (Morinda citrifolia L), sirih merah (Piper crocatum Ruiz & Pav), sirih hitam (Piper betle L), mahoni (Swietenia macrophylla King),), dan diperoleh 45 isolat kapang. Fermentasi dilakukan selama 14 hari dengan menggunakan media Potato Dextrose Broth dan hasil fermentasi kemudian diekstraksi dengan etil asetat. Skrining dilakukan dengan mengunakan uji α-glucosidase. Hasil skrining menunjukan bahwa isolat kapang A.Ap.3F, A.Ap.4F, B.Ap.4F, B.Os.1F, A.Pc.1F, B.Pc.1F dan B.Pc.2F, memiliki aktivitas antidiabetes. Aktivitas antioksidan isolat kapang A.Ap.3F dengan nilai IC50 31,45 ppm, B.Ap.1F dengan IC50 86,29 ppm dan B.Pc.1F dengan IC50 95,46 ppm. Identifikasi secara molekuler kapang A.Ap.3F adalah Colleotrichum truncatum strain PDC032. Pada fermentasi statis kapang A.Ap.3F didapatkan berat filtrat

0,19 g (9,5%) dan berat biomassa 0,56 g (28%), sedangkan hasil fermentasi dinamis didapatkan berat filtrat 2,05 g (34,17%) dan berat biomassa 2,31g (38,50%). Kromatografi kolom (50:1 ~ 1:1) hasil bioproduksi kapang endofit AAp.3F memberikan 5 fraksi. Hasil analisis GC-MS diperoleh bahwa Fraksi I terdiri dari tiga senyawa asam lemak yaitu, asam heksadekanoat, 9,12-oktadekadienoat dan oktadekanoat . Hasil analisa 1H NMR, 13C NMR, DEPT, COSY, HMQC dan HMBC dan GCMS diketahui bahwa isolat II-3 fraksi II adalah senyawa asam oktadekanoat [C18H34O2]. Hasil analisa GCMS diduga bahwa isolat III-2 fraksi III adalah senyawa dengan m/z = 256,1 dan m/z = 282. Hasil analisa GCMS diduga bahwa isolat IV-3 Fraksi IV adalah senyawa dengan m/z = 248 dan m/z = 280,1. Hasil analisis GC-MS diperoleh bahwa senyawa isolat V-6 fraksi V adalah isolat yang terdiri terdiri dari empat komponen senyawa utama yaitu senyawa dengan m/z = 221, m/z = 256, m/z = 282 dan m/z = 346. Aktivitas inhibisi terhadap α-Glucosidase yang paling tinggi adalah isolat III-2 Fraksi II sebesar 85,45% dan isolat IV-3 Fraksi IV sebesar 87,72%.