Isolasi dan penentuan struktur kimia serta uji aktivitas biologi dari kulit batang spesies Garcinia (G. tetrandra Pierre, G. eugeniaefolia Wall dan G. maingayi Hook)

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Abstrak

Tumbuhan obat dari genus Garcinia, termasuk familia Guttiferae telah banyak dikenal mengandung senyawa metabolit skunder seperti xanton, bitlavonoid dan benzofenon. Banyak senyawa yang ditemukan memiliki bioaktivitas yang potensial sebagai antibakteri, antimalaria dan bersifat sitotoksik terhadap beberapa se] kanker. Kurang lebih 50 spesies Garcinia tumbuh cli Indonesia termasuk Garcinia tetrandra Pierre, Garcinia eugeniaejblia Wall dan Garcinia maingayi Hook. Penelitian ini bertujuan mengungkapkan kandungan senyawa kimia dari ekstrak n-heksana dan aseton kulit batang pohon tiga tanaman tersebut di atas serta uji aktivitas biologi, yang meliputi uji awal toksisitas terhadap udangfirtemia salina Leach dan uji sitotoksisitas terhadap sel leukemia murin P388 serta qii antibakteri terhaclap Baccil us subtilis ATCC 6633, Exrherichia cali ATCC 25922,,S!aphyIococcus aureus ATCC 6538 dan Psedomonas auregenase DSM 43286. Isolasi dilakukan dengan tehnik kombinasi lcromatografi. Penentuan Slrulftur molekul dilakukan dengan menganalisis data-Clataspaktrunl UV-Vis, infra merah, massa, resonansi magnet inti ?H dan '3 C sam dan dua dimensi. Beberapa senyawa dinalisis dengan difraksi sinar-X. Dari basil isolasi ditemukan I l seuyawa termasuk 2 senyawa bam, meliputi beberapa senyawa turunan xanton, xanton dimer, isopltnilbenzofenon dan flavanol. Dari G. Ietrandra telah diisolasi dan diidentifikasi stigmasterol, cudmksanton, lupeol dan, xanton baru yang dinamai tetrandraksanton atau [l,3-dihidroksi .2?, 2?-dirneiil pimno (5?, 6?, 5, 6)]- xanton. Dari G. eugeniaefolia-telah diisolasi dan diidentiikasi stigmasterol dansexiyawa baru yang dinamai eugeniaefenon rnerupakan turunan benzofenon yangmengandung gugus isoprenil dan dimetil siklobutan. Dari G. maingayi telah diisolasi dan diidentlfikasi stigmasteml, camb0ginol, isoksantochymol, griffipaviksanton dan 5, 7, 2', 5?-3tetrahidrokSi flavan-3-ol. Dari hasil uji bioaktivitas, gtiflipaviksanton, carnboginol dan eugeniaefenon dinyatakan sangat aktif/toksik terhadap larva udimg (Anemia Salina Leach) yang memiliki alctivitas dengan LC50 masing-masing 1,06 x io* ; 1,69 dan 3,24 ,ug/mL, sedangkan senyawa isoksantochymol, cudraksanton dan lupeol dinyatakan tidal: aktii Dari hasil uji terhadap sel murin P3 88, senyawa isoksanthochymol dan grifiipaviksanton dinyatakan sangat aktif dalam menghambat pertumbuhannya, dengan IC50 1,47 dan 0,42 ,ug/ml.. Senyawa eugeniaefenon memiliki aktivitas sedang dengan IC50 2,5 ,ug/mL, sedangkan senyawa camboginol dan 5, 7, 2?, 5?- tetrahidroksi flavan-301 tidak aktif yang menunjukkan aktivitas dengan IC50 > 4 pg/rnL . Dari hasil uji antibakteri, senyawa camboginol dan eugeniaefenon memiliki aktivitas hambatan pertumbuhan mikroba pada lconsentrasi 10.000 ppm terhadap mikroba B. subtilis ATCC 6633, E. colli ATCC 25922, .SZ aureus ATCC 6538, P.auregenase DSM 43286 bertmut-turut 16, 13, 15 dan 14 mm: 13, 16, 13 dan 15 mm. Pada konsetrasi yang sama tetrasiklin menunjukkan aktivitas hambatan pertumbuhan mikroba rata-rata 30 mm.

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The medicinal plants in the genera of Garcinia belong to Guttiferae family have been known to be rich on secondary metabolites, such as xanthones, bitlavonoids and benzophenones. Some of wmpounds havetbeen reported as unique novel chemicals and having potential for various bioactivities as antibacterial, airimaia-

ia, and eymmxie against cancer cells About so ? Garcinia species -growing in Indonesia include Gm'einrh?tetrandra Pierre, Garcinia eugeniawlia Wall. and Garcinia maingyi Hook. This research is conducted to isolate the chemical constituents of n~hexane and acetone extracts
of stem barks and their biological activity evaluation, namely preliminary evaluation using brine shrimp lethality test against Artemia saline Leach, cytotoxic against P388 cultured murine cells and antimicrobial activity against
Baccilus subtilis ATCC 6633, Escherichia coli ATCC 25922, Staphylococcus aureus ATCC 6538" and Psedomonas auregenase DSM 43286. Isolation of the compounds was conducted through combined various chromatographic techniques. Structure elucidation ofthe isolates Wasperfonned by analysing their spectroscopic data, namely: UV-4Vis, inlia red, mass, one- and two-
dimension NMR The structures of -some of the isolates were also clarified by their X-ray diffraction dam. From this research, among ll isolates, 2 isolates were novel compoimds. The isolates were triterpepnegxantlione- derivatives,
xanthone dimers, isoprenylbenophenones, andtlavanol. From the stem bark of G. tetrandra stigrn asterol, cudraksantone, Iupeol and a new xanthone namely tetrandraxanthone or [l,3-dihydroxy-2?,2?;dimethyl pyrano-(5?,6?,5?,6)]-
xanthone have been isolated and identified. The work on G. eugeniaefolia, led to the isolation stigmasterol and a novel compound, eugcniaephenone, a benzophenone having isoprenyl groups and dimethyl cyclobutane. From G. maingayi. stigmasterol, camboginol, isoxanthochymol, griflipavixanthone and 5,7,2?,5?-tetrahydroxy ilavan-3-ol have been isolated and identified. From bioactivity test, griffipavixanthone, eugeniaephenone and carnboginol were strong cytotoxic to brine shrimp (Artemia salina Leach) lethality test results showing LC? 1,06 xlO'2 ; 1,69 and 3,24 pg/mL respectively. Meanwhile, the isoxantochymol, cudraxanthone and Iupeol were not active. From cytotoxicity against murine P-3 88 cultured cells test, showed that griffipavixanthone and isoxanthochymol ,were strong cytotoxic, judged by their IC50 values of 0.42 and 1.47 /xg/mL, respectively. Eugeniaephenon were also moderate cytotoxic having IC5Q 2.5 pg/mL. Meanwhile camboginol and 5,7,2?,5?~tetrahydroxy tlavan-3-ol were inactive, represented by its IC50 values more than 4 ,ug/mL. On evaluated for,their antibacterial activity. Camboginol and eugeniaephenone showed the highest antibacterial activity, having 'microbial growth inhibition against B. subtillis ATCC 6633, E. coli ATCC 25922, .SI aureus ATCC 6538, and P. auregenase DSM 43286. The inhibition diameter using concentration of 10,000 ppm, camhoginol and eugeniaefenone showed 16, l3, 15 and 14 mm; ind 13, 16, 13, and 15 mm, respectively. Tetracycline s9lution_was used as the positive control concentration of 10,000 ppm, showed diameter inhibition of 30 mm.