ISOLASI DAN ELUSIDASI STRUKTUR SENYAWA AKTIF SEBAGAI PENGHAMBAT ENZIM XANTIN OXIDASE, ENZIM TIROSINASE, DAN ENZIM *α-GLUKOSIDASE* DARI LICHEN *Stereocaulon graminosum* SCHAER.

Tesis

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Abstrak

Lichen *Stereocaulon graminosum* telah di koleksi di Gunung Talang (2572 mdpl), Kabupaten Solok, Sumatera Barat. Analisa fitokimia ekstrak etil asetat S. graminosum dengan menggunakan LC/MS-MS. Telah diidentifikasi 13 senyawa dengan LC/MS-MS dengan membandingkan massa molekul dari data MS/MS dengan data literatur (database lichen). Skrining fitokimia dan aktivitas inhibitor enzim xantin oxidase, tirosinase, dan *α-glukosidase* diujikan terhadap ekstrak etil asetat dengan metode KLT bioautografi. Hasil klt bioautografi ditandai dengan adanya spot noda yang menghambat reaksi antara enzim dan substrat serta dianalisa menggunakan reagen kromogenik seperti MTT dan FBB. Spot yang aktif menjadi acuan untuk isolasi senyawa aktif secara *bioassay guided*. Isolasi senyawa aktif dari ekstrak etil asetat didapatkan 8 senyawa aktif. Delapan senyawa dikarakterisasi dengan menggunankan spektrometer UV, IR, HRMS, dan NMR. Senyawa FE1.1, F1S, MOC, PRE, ET7F, ET7N dengan IC_{50} berturut-turut 66,803; 7,976; 14,700; 11,050; 45,756; dan 5,763 µM aktif dalam menghambat enzim xantin oxidase. Senyawa FE02, FE1.1, MOC, dan PRE memiliki aktivitas inhibitor enzim tirosinase dengan IC_{50} berturut-turut 150,500; 330,862; 116,500; dan 331,094 µM. FE01, FE1.1, F1S, MOC, PRE, dan ET7F aktif sebagai inhibitor enzim *α-glukosidase* dengan IC_{50} berturut-turut yakni 129,500; 178,960; 230,228; 305,354; 139,917; dan 263,183 µM. Senyawa MOC dan PRE aktif dalam menghambat kerja ketiga enzim. Namun dilihat dari nilai IC_{50} dan struktur, senyawa PRE menjadi kandidat baru sebagai inhibitor enzim xantin oxidase, tirosinase, dan *α-glukosidase.*

Kata Kunci : *Stereocaulon graminosum*, LC/MS-MS, xantin oxidase, tirosinase, *α-glukosidase*

ISOLATION AND STRUCTURE ELUCIDATION OF BIOACTIVE COMPOUNDS AND THEIR ENZYME INHIBITORY ACTIVITIES (XANTHINE OXIDASE, TYROSINASE, AND *α-GLUCOSIDASE* ENZYME) FROM LICHEN *Stereocaulon graminosum* SCHAER.

Abstract

Stereocaulon graminosum has been harvesetd in Mount Talang (2572 masl), Solok Regency, West Sumatra. Phytochemical analysis of ethyl acetate extract using LC/MS-MS. Thirteen compounds have been identified with LC/MS-MS by comparing the molecular mass of MS/MS data with literature (lichen database). The bioautographic TLC method evaluated the phytochemical screening and activity of xanthine oxidase, tyrosinase, and *α-glucosidase* inhibitors. The results of the bioautography TLC were characterized by the presence of spot stains that inhibited the reaction between the enzyme and the substrate and were analyzed using chromogenic reagents such as MTT and FBB. The active spot becomes a reference for the isolation of the active compound using a guided bioassay. Isolation of active compounds from ethyl acetate extract obtained 8 active compounds. Eight compounds were characterized using UV, IR, HRMS, and NMR spectrometers. Compounds FE1.1, F1S, MOC, PRE, ET7F, ET7N with IC_{50} of 66,803; 7,976; 14,700; 11,050; 45,756; and 5,763 µM, respectively) active in inhibiting the xanthine oxidase enzyme. Compound FE02, FE1.1, MOC, and PRE have tyrosinase enzyme inhibitor activity with IC_{50} respectively; 150,500; 330,862; 116,500; and 331,094 µM, respectively. Compound FE01, FE1.1, F1S, MOC, PRE, and ET7F were active as inhibitors of the *α-glucosidase* enzyme with IC_{50} of 129,500; 178,960; 230,228; 305,354; 139,917; and 263,183 µM, respectively. Compound MOC and PRE are active in inhibiting the activity of the three enzymes. However, judging from the IC_{50} value and structure, PRE is a new candidate as an inhibitor of xanthine oxidase, tyrosinase, and *α-glucosidase* enzymes.

Keywords: *Stereocaulon graminosum*, LC/MS-MS, xanthine oxidase, tyrosinase, *α-glucosidase*