ISOLASI DAN KARAKTERISASI POLIKETIDA DARI JAMUR ENDOFIT YANG BERASOSIASI PADA RIMPANG TEMULAWAK (*Curcuma xanthorrhiza* Roxb.) SERTA UJI AKTIVITASNYA SEBAGAI ANTIBIOTIK DAN ANTIKANKER

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INTISARI

Isolasi dan karakterisasi senyawa poliketida dari jamur endofit *Fusarium solani* yang berasosiasi pada rimpang *Curcuma xanthorrhiza* Roxb. dan dilakukan uji aktivitas antibiotik terhadap bakteri *American Type Culture Collection* (ATCC), *Multidrug-Resistant* (MDR) serta antikanker sel kanker payudara MCF-7 telah dilakukan. Isolasi jamur endofit menggunakan metode sterilisasi permukaan diikuti penanaman menggunakan media *Potato Dextrose Agar* (PDA). Fermentasi menggunakan media *Potato Dextrose Broth* (PDB) dalam cairan. Miselium diekstraksi padat-cair menggunakan pelarut metanol. Padatan hasil partisi diskrining antibiotik dan dipisahkan menjadi fraksi-fraksi menggunakan kromatografi HPLC preparatif dengan eluen asetonitril dan air *ultrapure*. Isolat senyawa dikarakterisasi menggunakan spektroskopi UV-Vis, LC-HRMS, NMR 1D, dan NMR 2D. Aktivitas antibiotik isolat diuji dengan metode *microdilution* dan antikanker menggunakan metode MTT.

Ekstrak kasar metanol diskrining antibiotik dan aktif dalam penghambatan pertumbuhan bakteri. Hasil pemisahan diperoleh 13 fraksi dengan fraksi F4, F5, dan F6 bersifat antibiotik ATCC *B. subtilis* dengan nilai *Minimum Inhibitory Concentration* (MIC) sebesar 1,56 µg/mL. Fraksi F4, F5, F7, dan F8 diidentifikasi dengan NMR diperoleh senyawa (1) 7-klorofolipastatin dan senyawa (2) agonodepside A. Senyawa 1 bersifat antibiotik terhadap bakteri ATCC *S. aureus* dan *P. aeruginosa* dengan nilai (MIC 0,78 dan 1,56 µg/mL), namun bakteri MDR tidak bersifat antibiotik. Senyawa 2 bersifat antibiotik terhadap bakteri ATCC *S. aureus*, *E. coli*, *P. aeruginosa*, dan *B. subtilis* dengan nilai (MIC 0,78; 0,78; 1,56; dan 1,56 µg/mL) serta bakteri MDR menunjukkan aktivitas antibiotik *S. aureus* dan *P. aeruginosa* dengan nilai (MIC 0,39 µg/mL). Hasil uji antikanker MCF-7 diperoleh senyawa 1 dan senyawa 2 bersifat poten dengan nilai IC_{50} sebesar 0,122 dan 6,000 µg/mL.

Kata kunci: *Curcuma xanthorrhiza* Roxb., poliketida, spektroskopi NMR, antibiotik, sel kanker payudara MCF-7

ISOLATION DAN CHARACTERIZATION OF POLYKETIDE FROM ENDOPHYTIC FUNGI IN JAVA TURMERIC (*Curcuma xanthorrhiza Roxb.) RHIZOME AND ITS ACTIVITY AS ANTIBIOTIC AND ANTICANCER*

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ABSTRACT

The isolation and characterization of polyketide compounds from the endophytic fungus *Fusarium solanni* associated with *Curcuma xanthorrhiza* Roxb. dan its activity test as an antibiotic against The American Type Culture Collection (ATCC), multidrug-resistant (MDR) bacterial strains and anticancer against breast cancer cells MCF-7 have been carried out. Isolation was used for surface sterilization and fermentation was used *potato dextrose broth* as a medium. Extraction was conducted with a solid-liquid extraction method using methanol. The crude extracts were evaluated for their antibiotics. The active extract was separated into fractions using the chromatographic fragmentation method by preparative HPLC with eluent acetonitrile and ultrapure water. The pure isolated compounds were determined by UV-Vis, LC-HRMS, 1D, and 2D NMR spectroscopy. Antibiotic assay of the isolated compounds was done using microdilution and anticancer using MTT assay.

Methanol extract was active to inhibit growth of ATCC bacteria. There are threeteen of fractions and fractions of F4, F5, and F6 were found as potent exhibiting good antibiotic activity against *B. subtilis* ATCC, with a MIC of 1,56 µg/mL. Fractions of F4, F5, F7, and F8 were purificationed. Identification of these fractions isolated had two single compounds. There are two isolated compounds obtained, namely (1) 7-chlorofolipastatin and (2) agonodepside A, compound 1 has antibiotic against *S. aureus* and *P. aeruginosa* ATCC strains (MIC of 0,78 and 1,56 µg/mL, respectively), however, no antibiotic activity was observed against MDR bacteria. Compound 2 has antibiotic against *S. aureus*, *E. coli*, *P. aeruginosa*, and *B. subtilis* ATCC strains (MIC of 0,78; 0,78; 1,56; and 1,56 µg/mL, respectively) and against *S. aureus* and *P. aeruginosa* MDR strains (MIC of 0,39 µg/mL**).** Compounds 1 dan 2 were established to be extremely toxic against MCF-7 with IC_{50} values of 0,122 and 6,000 µg/mL, respectively.

Keywords: *Curcuma xanthorrhiza* Roxb., polyketide compounds, NMR spectroscopy, antibacterial activity, MCF-7 breast cancer cells