ABSTRAK

Kanker payudara memiliki prevalensi yang tinggi di seluruh dunia. Di Indonesia sendiri, prevalensi kanker payudara tertinggi ada di DI Yogyakarta. Pada jenis kanker payudara *triple-negative* dan *human epidermal growth factor receptor 2-positive* (HER2-*positive*), *Matrix Metalloproteinase-9* (MMP-9) diekspresikan secara berlebihan. MMP-9 berperan penting dalam proses metastasis dan angiogenesis. Hingga saat ini, banyak *Matrix Metalloproteinase Inhibitor* (MMPI) telah ditemukan namun kebanyakan dari mereka tidak selektif terhadap MMP-9 karena menarget sisi *catalytic domain* yang menyebabkan efek samping dari MMPI lebih dominan daripada manfaatnya. Penelitian ini bertujuan untuk mensintesis senyawa *N*-(4-klorofenil)-3-(1,3-dimetil-2,6-diokso-2,3,6,7-tetrahidro-1H-purin-7-il)propanamida (KFPP) dan menguji aktivitasnya sebagai penghambat MMP-9 secara selektif, karena dirancang untuk berikatan dengan *domain hemopexin* yang lebih selektif. Sintesis senyawa KFPP dilakukan dalam dua tahap yaitu tahap sintesis senyawa intermediet dengan mereaksikan 4-kloroanilin dan 3-bromopropionil klorida dengan katalis piridin, lalu diikuti tahap sintesis senyawa KFPP dengan mereaksikan teofilin dan senyawa intermediet menggunakan katalis K_2CO_3. Hasil penelitian menunjukkan bahwa senyawa bukan KFPP dapat disintesis dalam dua tahap yakni S_NA dan S_N2. Rendemen senyawa *N*-(4-klorofenil)-*N*-(1,2-dihidropiridin-1-il)-3-(1,3-dimetil-2,6-diokso-2,3,6,7-tetrahidro-1H-purin-7-il)propanamida atau KFDHPPP adalah 19,59%. Aktivitas penghambatan senyawa KFDHPPP terhadap MMP-9 adalah -2%.

Kata kunci: KFPP, *hemopexin domain*, kanker payudara, MMP-9, uji *in vitro*

ABSTRACT

Breast cancer has a high prevalence throughout the world. In Indonesia, the highest prevalence of breast cancer is occured in DI Yogyakarta. In triple-negative breast cancers and human epidermal growth factor receptor 2-positive (HER2-positive), Matrix Metalloproteinase-9 (MMP-9) is over-expressed. MMP-9 plays an important role in the process of metastasis and angiogenesis. To date, many MMP Inhibitors (MMPI) have been found, however, most of them are not selective towards MMP-9 because they target the catalytic domain prior to the side effects of MMPI rather than its benefits. This study aims to synthesize the compound *N*-(4-chlorophenyl)-3-(1,3-dimethyl-2,6-dioxo-2,3,6,7-tetrahydro-1H-purine-7-yl)propanamide (KFPP) and selectively test its activity as an inhibitor of MMP-9, because it is designed to bind to the hemopexin domain. The synthesis of KFPP was carried out in two stages, namely the intermediate compound by reacting 4-chloroaniline and 3-bromopropionyl chloride with pyridine as the catalyst, followed by the synthesis of KFPP compound by reacting theophylline and intermediate compound using K_2CO_3 as the catalyst. The results showed that non-KFPP compound could be synthesized in two stages, namely S_NA and S_N2. The yield of *N*-(4-chlorophenyl)-*N*-(1,2-dihydropyridine-1-yl)-3-(1,3-dimethyl-2,6-dioxo-2,3,6,7-tetrahydro-1H-purine-7-yl)propanamide or KFDHPPP is 19.59%. Inhibitory activity of KFDHPPP compound against MMP-9 is -2%.

Keywords: KFPP, hemopexin domain, breast cancer, MMP-9, in vitro test