SINTESIS DAN UJI SITOTOKSISITAS SENYAWA KALKON DAN PIRAZOLINA DARI 4-ASETILPIRIDIN DAN TURUNAN BENZALDEHIDA TERHADAP SEL KANKER

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INTISARI

Senyawa kalkon dan pirazolina diketahui memiliki potensi aktivitas antikanker. Pada penelitian ini dilakukan sintesis senyawa kalkon dan pirazolina dari 4-asetil piridin dan turunan benzaldehida untuk kemudian diuji sitotoksisitasnya terhadap beberapa sel kanker. Kalkon **A** dan **B** disintesis melalui reaksi kondensasi *Claisen-Schmidt* dari reaktan 4-asetilpiridin dengan benzaldehida dan 4-metoksibenzaldehida. Reaksi dilakukan dengan metode pengadukan selama 24 jam pada suhu ruang dengan pelarut metanol dan katalis NaOH. Pirazolina **A** dan **B** disintesis melalui reaksi siklisasi kalkon **A** dan **B** dengan fenilhidrazina. Reaksi dilakukan dengan metode refluks menggunakan pelarut etanol dan katalis KOH. Seluruh senyawa dielusidasi strukturnya menggunakan spektroskopi GC-MS, ATR-IR, ^{1}H-, dan ^{13}C-NMR. Uji sitotoksisitas dilakukan dengan menggunakan metode MTT terhadap sel kanker HeLa, WiDr, MCF-7, dan T47D serta sel normal Vero.

Sintesis kalkon **A** menghasilkan padatan putih dengan persen hasil 75% dan kemurnian 92,16%, sedangkan kalkon **B** menghasilkan padatan putih kecokelatan dengan persen hasil 83% dan kemurnian 98,63%. Sintesis pirazolina **A** menghasilkan padatan cokelat dengan persen hasil 69% dan kemurnian 97,36%, sedangkan pirazolina **B** menghasilkan padatan merah kecokelatan dengan titik leleh 97,8-99,5 °C dengan persen hasil 71% dan kemurnian 85,89%. Hasil uji sitotoksisitas antikanker menunjukkan bahwa senyawa pirazolina **B** memiliki aktivitas tinggi terhadap sel kanker HeLa dan WiDr, masing-masing memiliki nilai IC_{50} 1,93 dan 0,52 μg/mL dengan indeks selektivitas berturut-turut 50,93 dan 189,32.

Kata kunci: 4-asetilpiridin, kalkon, pirazolina, uji antikanker

SYNTHESIS AND CYTOTOXICITY ASSAY OF CHALCONE AND PYRAZOLINE COMPOUNDS FROM 4-ACETYLPYRIDINE AND BENZALDEHYDE DERIVATIVES AGAINST CANCER CELLS

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ABSTRACT

Chalcones and pyrazolines are known to have potential anticancer activity. In this study, chalcones and pyrazolines were synthesized from 4-acetylpyridine and various benzaldehyde derivatives, and their cytotoxicity was subsequently evaluated against several cancer cell lines. Chalcone **A** and **B** were obtained via Claisen-Schmidt condensation of 4-acetylpyridine with benzaldehyde and 4-methoxybenzaldehyde, respectively. The reaction was carried out by stirring in methanol at room temperature for 24 hours using NaOH as a catalyst. Subsequently, pyrazolines **A** and **B** were synthesized through cyclization of the corresponding chalcones with phenylhydrazine under reflux in ethanol using KOH as a catalyst. The chemical structures of all synthesized compounds were elucidated using GC-MS, ATR-IR, ^{1}H-, and ^{13}C-NMR spectroscopy. Cytotoxicity activity was assessed using the MTT method against HeLa, WiDr, MCF-7, and T47D cancer cell lines as well as normal Vero cells.

The synthesis of chalcone **A** yielded a white solid with a yield of 75% and purity of 92.16%, whereas chalcone **B** was obtained as a brownish-white solid with a yield of 82% and purity of 98.63%. Pyrazoline **A** was synthesized as a brown solid with a yield of 69% and purity of 97.36%, while pyrazoline **B** was obtained as a red-brown solid with a yield of 71% and a purity of 85.89%. The anticancer assay revealed that pyrazoline **B** had the highest activity against HeLa and WiDr cancer cells, with IC_{50} values of 1.93 and 0.52 μg/mL, respectively, and selectivity indexes of 50.93 and 189.32.

Keywords: 4-acetylpyridine, anticancer test, chalcone, pyrazoline