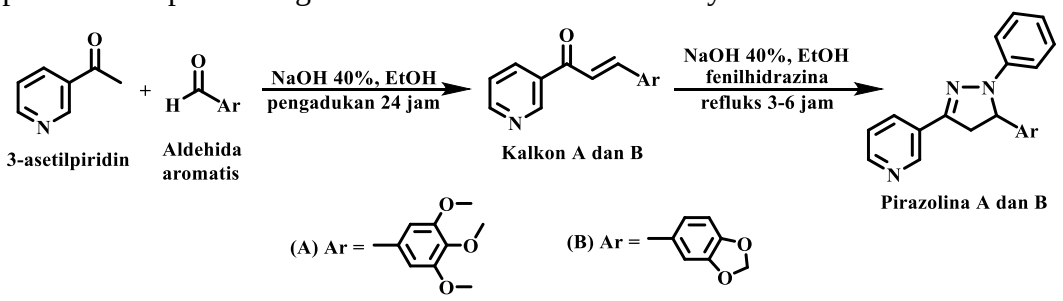
SINTESIS DAN UJI SITOTOKSISITAS TURUNAN KALKON DAN PIRAZOLINA BERBASIS 3-ASETILPIRIDIN TERHADAP LINI SEL KANKER

Hermawan Dwi Hartanto
20/462224/PA/20196

INTISARI

Sintesis senyawa turunan kalkon dan pirazolina berbasis 3-asetilpiridin dan uji aktivitasnya terhadap sel kanker telah dilakukan. Senyawa turunan kalkon **A** dan **B** disintesis melalui reaksi aldolkondensasi *Claisen-Schmidt* antara 3-asetilpiridin dengan 3,4,5-trimetoksibenzaldehida dan piperonal dalam pelarut etanol dan katalis NaOH 40% (b/v) dengan pengadukan selama 24 jam pada suhu ruang. Senyawa turunan pirazolina **A** dan **B** diperoleh dengan merefluks fenilhidrazina dan senyawa kalkon **A** dan **B** dalam pelarut etanol menggunakan katalis NaOH 40% (b/v) selama 3-6 jam. Produk sintesis kemudian dielusidasi strukturnya dengan instrumen FTIR, GC-MS, ^{1}H-NMR, dan ^{13}C-NMR. Uji aktivitas antikanker dari senyawa turunan kalkon dan pirazolina dilakukan secara in vitro terhadap garis sel kanker payudara (T47D), kolon (WiDr), serviks (HeLa), dan sel normal (Vero).

Reaksi aldolkondensasi *Claisen-Schmidt* menghasilkan kalkon **A** yang berwujud padatan putih dengan persen hasil 91,17% dan titik leleh 218-220 ℃, sedangkan Kalkon **B** diperoleh berupa padatan kuning cerah dengan titik leleh 207-208 ℃ dan persen hasil 72,67%. Sintesis senyawa pirazolina **A** menghasilkan padatan merah yang memiliki titik leleh sebesar 133-135 ℃ dengan persen hasil 66,32%, sedangkan sintesis pirazolina **B** didapatkan dalam bentuk padatan coklat muda dengan titik leleh sebesar 118-120 ℃ dan persen hasil 86,30%. Uji sitotoksisitas terhadap sel kanker T47D, WiDr, HeLa dan Vero menunjukkan bahwa kalkon **A** memiliki aktivitas terbaik dengan IC_{50} 5,41 μg/mL terhadap sel HeLa. Pirazolina **A** memiliki aktivitas yang lebih tinggi dengan IC_{50} 1,20 μg/mL terhadap sel HeLa. Dari hasil ini dapat disimpulkan bahwa pirazolina umumnya memiliki toksisitas yang lebih tinggi daripada kalkon, sehingga adanya cincin pirazolina dapat meningkatkan aktivitas antikanker senyawa tersebut.



Kata kunci: 3-asetilpiridin, antikanker, kalkon, pirazolina, uji MTT.

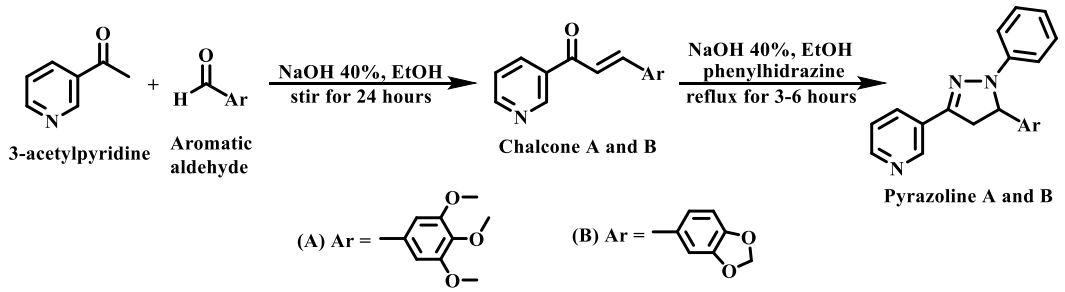
SYNTHESIS AND CITOTOXICITY ASSAY OF 3-ACETYLPYRIDINE-BASED CHALCONE AND PYRAZOLINE DERIVATIVES AGAINST CANCER CELL LINES

Hermawan Dwi Hartanto
20/462224/PA/20196

ABSTRACT

Chalcone and pyrazoline derivatives based on 3-acetylpyridine were successfully synthesized, and their cytotoxicity was tested against various cancer cell lines. Chalcones **A** and **B** were synthesized via the Claisen-Schmidt aldol condensation by reacting 3-acetylpyridine with 3,4,5-trimethoxybenzaldehyde and piperonal in ethanol, using a 40% (m/v) NaOH as a catalyst, and stirring for 24 h at room temperature. Pyrazolines **A** and **B** were obtained by refluxing phenylhydrazine with chalcones **A** and **B** in ethanol using a 40% (m/v) NaOH catalyst for 3-6 h. The structures of all synthesized products were elucidated using FTIR, GC-MS, ^{1}H- and ^{13}C-NMR spectrometers. To evaluate their anticancer activity, chalconesand pyrazolines were tested *in vitro* against breast cancer (T47D), colon cancer (WiDr), cervical cancer (HeLa), and normal (Vero) cell lines.

The Claisen-Schmidt aldol condensation yielded chalcone **A** in 91.17% as a white solid with a m.p of 218-220 ℃, while chalcone **B** was obtained as a bright yellow solid with a m.p of 207-208 ℃ and a 72.67% yield. The synthesis of pyrazoline **A** produced a red solid, having an m.p 133-135 ℃ with a 66.32% yield, whereas pyrazoline **B** was obtained as a light brown solid, with a m.p 118-120 ℃ and an 86.30% yield. Cytotoxicity assay against T47D, WiDr, HeLa and Vero cancer cell lines revealed that chalcone **A** exhibited the highest activity, with an IC_{50} of 5.41 µg/mL against HeLa cell. Pyrazoline **A** demonstrated even higher activity, with an IC_{50} of 1.20 µg/mL against HeLa cell. This result, suggest that pyrazoline generally possess higher toxicity than chalcones, indicating that the presence of the pyrazoline ring enhances the compound's anticancer activity.



Keywords: 3-Acetylpiridine, anticancer, chalcone, MTT assay, pyrazoline.