SINTESIS DAN UJI AKTIVITAS ANTIKANKER KLOROKUMARIN DAN KLOROKUMARIN-KALKON TERSUBSTITUSI METOKSI

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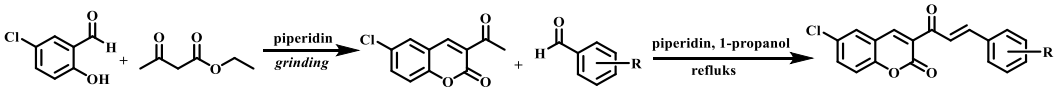
INTISARI

Sintesis klorokumarin dan klorokumarin-kalkon serta uji sitotoksisitasnya terhadap sel kanker telah dilakukan. Senyawa klorokumarin disintesis melalui reaksi kondensasi *Knoevenagel* antara 5-kloro-2-hidroksibenzaldehida dan etil asetoasetat dengan katalis piperidin menggunakan metode *grinding*. Senyawa kalkon **A** dan **B** disintesis melalui reaksi kondensasi *Claisen-Schmidt* antara klorokumarin dan benzaldehida tersubstitusi metoksi dengan katalis piperidin dalam pelarut 1-propanol menggunakan metode refluks. Semua produk dikarakterisasi dengan uji titik leleh, GC-MS, ATR-IR, ^{1}H-NMR, dan ^{13}C-NMR. Senyawa hasil sintesis diuji sitotoksisitasnya terhadap sel kanker payudara (T47D dan MCF-7), serviks (HeLa), kolon (WiDr), dan sel normal (Vero).

Senyawa klorokumarin diperoleh sebagai padatan putih dengan persen hasil 77% dan titik leleh 205,8-207,1 °C. Kalkon **A** dihasilkan sebagai padatan kuning pucat dengan persen hasil 46% dan titik leleh 195,3-196,5 °C, sedangkan kalkon **B** diperoleh sebagai padatan kuning cerah dengan persen hasil 33% dan titik leleh 240,2-241,8 °C. Pengujian sitotoksisitas menunjukkan bahwa kalkon **A** memiliki aktivitas antikanker paling kuat, terutama terhadap sel kanker serviks (HeLa) dan sel kanker kolon (WiDr). Nilai IC_{50} dan indeks selektivitas (SI) dari kalkon **A** terhadap sel kanker serviks (HeLa) yaitu 35,08 µg/mL dan 9,93, sedangkan terhadap sel kanker kolon (WiDr) yaitu 55,23 µg/mL dan 6,31. Hasil ini menunjukkan bahwa kalkon **A** memiliki potensi menjanjikan sebagai agen antikanker, khususnya untuk pengobatan kanker serviks dan kanker kolon.



Kata kunci: antikanker, kalkon, klorokumarin, sitotoksisitas.

SYNTHESIS AND ANTICANCER ACTIVITY ASSAY OF CHLOROCOUMARIN AND METHOXY-SUBSTITUTED CHLOROCOUMARIN-CHALCONES

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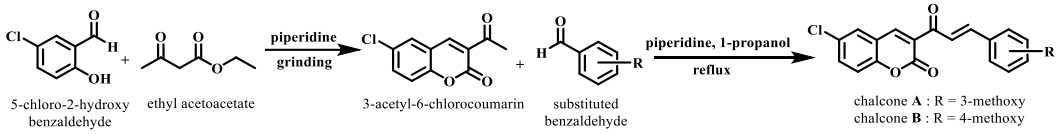
ABSTRACT

The synthesis of chlorocoumarin and chlorocoumarin-chalcone derivatives was successfully carried out, followed by the evaluation of their cytotoxic activity against cancer cell lines. The chlorocoumarin was synthesized via a Knoevenagel condensation reaction between 5-chloro-2-hydroxybenzaldehyde and ethyl acetoacetate, catalyzed by piperidine using a grinding method. Chalcones **A** and **B** were obtained through a Claisen-Schmidt condensation reaction between chlorocoumarin and methoxy-substituted benzaldehydes in the presence of piperidine as a catalyst, using 1-propanol as solvent under reflux conditions. All synthesized products were characterized using melting point testing, GC-MS, ATR-IR, ^{1}H-NMR, and ^{13}C-NMR spectroscopy. Cytotoxicity assays were performed against breast cancer cell lines (T47D and MCF-7), cervical cancer cells (HeLa), colon cancer cells (WiDr), and normal cells (Vero).

The chlorocoumarin was obtained as a white solid with a yield of 77% and a melting point of 205.8-207.1 °C. Chalcone **A** was isolated as a pale yellow solid with a yield of 46% and a melting point of 195.3-196.5 °C, while chalcone **B** was obtained as a bright yellow solid with a yield of 33% and a melting point of 240.2-241.8 °C. Cytotoxicity testing revealed that Chalcone **A** exhibited the most potent anticancer activity, particularly against cervical cancer (HeLa) and colon cancer (WiDr) cells. The IC_{50} and selectivity index (SI) values of chalcone **A** against HeLa cells were 35.08 µg/mL and 9.93, respectively, while against WiDr cells, the values were 55.23 µg/mL and 6.31. These findings suggest that chalcone **A** shows promising potential as an anticancer agent, especially for the treatment of cervical and colon cancers.



Keywords: anticancer, chalcone, chlorocoumarin, cytotoxicity.