SINTESIS ANALOG KURKUMIN MONOKETON BERBAHAN DASAR TURUNAN BENZALDEHIDA DENGAN ASETON DAN UJI *IN VITRO* ANTIKANKER TERHADAP SEL KANKER PAYUDARA (T47D) DAN SERVIKS (HeLa)

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INTISARI

Sintesis analog kurkumin monoketon berbahan dasar turunan benzaldehida dengan aseton telah dilakukan. Senyawa hasil sintesis diuji sitotoksisitasnya sebagai agen antikanker secara *in vitro* melalui penentuan nilai IC_{50} terhadap sel kanker payudara (T47D) dan serviks (HeLa).

Sintesis senyawa (1*E*,3*E*,6*E*,8*E*)-1,9-difenil-1,3,6,8-nanotetraen-5-on (analog kurkumin monoketon A), (1*E*,4*E*)-1,5-bis(3,4-dimetoksifenil)penta-1,4-dien-3-on (analog kurkumin monoketon B) dan (1*E*,4*E*)-1,5-bis(3,4,5-trimetoksifenil)penta-1,4-dien-3-on (analog kurkumin monoketon C) dilakukan melalui reaksi kondensasi Claisen-Schmidt antara aseton dengan 3 senyawa turunan benzaldehida (sinamaldehida, veratraldehida dan 3,4,5-trimetoksibenzaldehida) dalam pelarut etanol dan katalis KOH 5%. Sintesis dilakukan dengan cara refluks pada suhu 50 ºC selama 2 jam untuk analog kurkumin monoketon B dan refluks selama 50 menit untuk sintesis analog kurkumin monoketon A dan C. Produk yang terbentuk diukur titik leburnya dan diidentifikasi strukturnya dengan menggunakan FTIR, DI-MS dan ^{1}H-NMR. Uji sitotoksisitas dilakukan terhadap sel T47D dan HeLa dengan menggunakan metode MTT.

Analog kurkumin monoketon A, B dan C yang dihasilkan berupa padatan berwarna kuning dengan rendemen berturut-turut sebesar 75,62; 60,48; dan 89,66% serta titik lebur berturut-turut sebesar 123-125; 70-72; dan 132-134 ºC. Hasil uji sitotoksisitas menunjukkan bahwa senyawa analog kurkumin monoketon C memiliki aktivitas yang tinggi dalam menghambat sel T47D dan HeLa dengan nilai IC_{50} berturut-turut sebesar 1,29 µg/mL dan 0,310 µg/mL. Senyawa C juga paling selektif dalam menghambat sel T47D dan HeLa dengan nilai indeks selektivitas berturut-turut sebesar 114 dan 474. Berdasarkan nilai tersebut dapat disimpulkan bahwa senyawa analog kukumin monoketon C berpotensi sebagai agen antikanker.

Kata kunci: analog kurkumin monoketon, kondensasi Claisen-Schmidt, uji sitotoksisitas, sel kanker, metode MTT

SYNTHESIS OF MONOKETONE CURCUMIN ANALOGUES FROM DERIVATIVES OF BENZALDEHYDE WITH ACETONE AND IN VITRO ANTICANCER TEST AGAINST BREAST (T47D) AND CERVICAL (HeLa) CANCER CELL

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ABSTRACT

Synthesis of monoketone curcumin analogues from derivatives of benzaldehyde with acetone had been conducted. The synthesized compounds were tested by in vitro cytotoxicity assay as anticancer agent by determining IC_{50} values against breast (T47D) and cervical (HeLa) cancer cell.

Synthesis of (1*E*,3*E*,6*E*,8*E*)-1,9-diphenyl-1,3,6,8-nanotetraen-5-one (monoketone curcumin analogue A), (1*E*,4*E*)-1,5-bis(3,4-dimethoxyphenyl) penta-1,4-dien-3-one (monoketone curcumin analogue B) and (1*E*,4*E*)-1,5-bis (3,4,5-trimethoxyphenyl)penta-1,4-dien-3-one (monoketone curcumin analogue C) were performed through Claisen-Schmidt condensation reaction between acetone and derivatives of benzaldehyde (cinnamaldehyde, veratraldehyde and 3,4,5-trimethoxybenzaldehyde) in ethanol as solvent and KOH 5% as catalyst. Synthesis of monoketone curcumin analogue B was performed with reflux method at 50 ºC for 2 hours while synthesis of monoketone curcumin analogues A and C were performed with reflux method at 50 ºC for 50 minutes. The melting point of the obtained products were measured and its structure were identified by using FTIR, DI-MS and ^{1}H-NMR. The cytotoxicity assay against T47D and HeLa cancer cells was performed with MTT method.

The curcumin analogues A, B and C were obtained as yellow solid with melting point 123-125; 70-72 and 132-134 ºC respectively. The products had been succesfully synthesized with yield of 75.62; 60.48 and 89.66% respectively. The cytotoxicity assay showed that curcumin analogue C had high activity for inhibiting the growth of T47D and HeLa cells with IC_{50} value 1.29 µg/mL and 0.310 µg/mL respectively. Curcumin analogue C was also the most selective in inhibiting T47D and HeLa cells growth with selectivity index value of 114 and 474 respectively. It was concluded that curcumin analogue C had potential to be an anticancer agent.

Keywords: monoketone curcumin analogue, Claisen-Schmidt condensation, cytotoxicity test, cancer cell, MTT method