

**SINTESIS ANALOG KURKUMIN MONOKETON BERBAHAN DASAR  
4-BENZILOKSIBENZALDEHIDA DAN UJI AKTIVITASNYA SEBAGAI  
INHIBITOR ENZIM  $\alpha$ -AMILASE**

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**INTISARI**

Sintesis analog kurkumin monoketon berbahan dasar 4-benziloksibenzaldehida dan uji aktivitasnya sebagai inhibitor enzim  $\alpha$ -amilase telah dilakukan. Sintesis bahan dasar 4-benziloksibenzaldehida dilakukan melalui reaksi eterifikasi Williamson pada senyawa 4-hidroksibenzaldehida menggunakan pelarut DMF,  $K_2CO_3$  sebagai basa, KI dan benzil klorida. Senyawa analog kurkumin disintesis dengan mereaksikan 4-benziloksibenzaldehida dan monoketon berupa aseton (analog kurkumin **A** (1E,4E)-1,5-bis(4-benziloksifenil)-1,4-pentadien-3-on) dan siklopentanon (analog kurkumin **B** (2E,5E)-2,5bis(4-benziloksibenzilidin)siklopentanon) dalam pelarut etanol. Sintesis dilakukan dalam kondisi basa dengan pengadukan pada suhu 52 °C selama 50 menit. Selanjutnya hasil sintesis kemudian dianalisis strukturnya menggunakan spektrometer FTIR, DI-MS,  $^1H$ - dan  $^{13}C$ -NMR. Senyawa analog kurkumin yang diperoleh kemudian diuji aktivitas inhibisinya terhadap enzim  $\alpha$ -amilase serta ditentukan tipe inhibitornya. Uji aktivitas inhibisi terhadap enzim  $\alpha$ -amilase dilakukan pula pada akarbosa sebagai pembandingan.

Sintesis 4-benziloksibenzaldehida menghasilkan padatan berwarna putih dengan titik leleh 71-74 °C dan rendemen sebesar 95,42%. Sintesis analog kurkumin A menghasilkan padatan berwarna kuning pucat dengan titik leleh sebesar 183-185 °C dan rendemen 57,65%. Sintesis analog kurkumin B menghasilkan padatan berwarna kuning dengan titik leleh sebesar 232-234 °C dan rendemen sebesar 93,10%. Senyawa analog kurkumin A menunjukkan aktivitas inhibisi tertinggi sebesar 97,27% pada konsentrasi 1 mM, sedangkan senyawa analog kurkumin B menunjukkan aktivitas inhibisi tertinggi sebesar 95,42% pada konsentrasi 0,5 mM. Aktivitas inhibisi akarbosa menghasilkan presentase tertinggi sebesar 90,19% pada konsentrasi 1 mM. Hasil ini menunjukkan senyawa analog kurkumin A dan B memiliki aktivitas inhibisi terhadap enzim  $\alpha$ -amilase yang lebih baik dibanding akarbosa. Penurunan nilai  $K_M$  dan  $V_{maks}$  pada senyawa analog kurkumin A dan B menunjukkan bahwa tipe inhibitor senyawa analog kurkumin A dan B adalah inhibitor unkompetitif.

Kata kunci: akarbosa, analog kurkumin, enzim  $\alpha$ -amilase, 4-benziloksibenzaldehida.

## SYNTHESIS OF CURCUMIN ANALOGUES MONOKETONE FROM 4-BENZYLOXYBENZALDEHYDE AND THEIR INHIBITION ASSAY AGAINST $\alpha$ -AMYLASE ENZYME

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### ABSTRACT

Synthesis of curcumin analogues monoketone from 4-benzyloxybenzaldehyde and their inhibition assay against  $\alpha$ -amylase enzyme had been done. Synthesis of 4-benzyloxybenzaldehyde was carried out by etherification Williamson reaction at 4-hydroxybenzaldehyde with DMF as a solvent,  $K_2CO_3$  as a base, KI and benzyl chloride. Curcumin analogues were synthesized by reacting 4-benzyloxybenzaldehyde and monoketone such as acetone (curcumin analogue **A** (1E,4E)-1,5-bis(4-benzyloxyphenyl)-1,4-pentadiene-3-one) and cyclopentanone (curcumin analogue **B** (2E,5E)-2,5-bis(4-benzyloxybenzylidene)cyclopentanone) with ethanol as a solvent. Synthesis was carried out in base condition by stirring at 50 °C for 50 minutes. The structure elucidation was done by FTIR spektrometer, DI-MS,  $^1H$  and  $^{13}C$ -NMR. Inhibition assay against  $\alpha$ -amylase enzyme was performed towards product of analogue curcumin synthesis and type of inhibitors was investigated. Inhibition assay against  $\alpha$ -amylase enzyme also carried out towards acarbose as a comparison.

Synthesis of 4-benzyloxybenzaldehyde was produced as a white solid, with m.p 71-74 °C in 95.42%. Curcumin analogue A was produced as a pale-yellow solid with m.p 183-185 °C in 57.65%. Curcumin analogue B was produced as a yellow solid with m.p 232-234 °C in 93.10%. Curcumin analogue A has a highest inhibition 97.27% at 1 mM, while curcumin analogue B has a highest inhibition 95.42% at 0.5 mM. Acarbose has a highest inhibition 90.19% at 1 mM. This results showed that curcumin analogues has better inhibition assay against  $\alpha$ -amylase enzyme than acarbose. Deficiency in the values of  $K_M$  and  $V_{maks}$  curcumin analogues A and B showed that type inhibitors of curcumin analogues A and B were considered as uncompetitive inhibitor.

Key words: acarbose, analogue curcumin, enzyme of  $\alpha$ -amylase, 4-benzyloxybenzaldehyde.