

## **SINTESIS DAN UJI INHIBISI ANALOG KURKUMIN DARI VANILIN TERHADAP ENZIM $\alpha$ -AMILASE SERTA EFEK SINERGITAS DENGAN ASAM FERULAT**

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### **INTISARI**

Sintesis dan uji inhibisi senyawa analog kurkumin dari vanilin dan keton berupa sikloheksanon, siklopentanon dan aseton terhadap enzim  $\alpha$ -amilase serta efek sinergitasnya dengan asam ferulat telah dilakukan. Penelitian ini diawali dengan sintesis senyawa analog kurkumin yang melibatkan kondensasi Claisen-Schmidt dengan cara mereaksikan vanilin dengan sikloheksanon menghasilkan 2,6-bis((E)-4-hidroksi-3-metoksifenil)sikloheksa-1-on (analog kurkumin A), dengan siklopentanon menghasilkan 2,5-bis((E)-4-hidroksi-3,5-dimetilbenzilidin)siklopenta-1-on (analog kurkumin B) dan dengan aseton menghasilkan 1,5-bis((E)-4-hidroksi-3-metoksifenil)-1,4-pentadien-3-on (analog kurkumin C) menggunakan katalis asam. Pengujian aktivitas inhibisi dan efek sinergitasnya dengan asam ferulat dilakukan terhadap enzim  $\alpha$ -amilase dengan menggunakan iodine sebagai reagen.

Hasil sintesis diperoleh senyawa analog kurkumin A berupa padatan berwarna hijau kekuningan dengan rendemen 83,60% dan titik leleh 176-178 °C. Analog kurkumin B berupa padatan berwarna hijau kekuningan dengan rendemen 90,34% dan titik leleh 212-214 °C. Analog kurkumin C diperoleh padatan berwarna coklat dengan rendemen 66,25% dan titik leleh 98-99 °C. Hasil uji inhibisi analog kurkumin A dan B terhadap enzim  $\alpha$ -amilase menunjukkan aktivitas inhibisi tertinggi pada konsentrasi 0,0625 mM sebesar 53,33 % dan 59,33 %, sedangkan analog kurkumin C menunjukkan aktivitas inhibisi tertinggi pada konsentrasi 0,125 mM sebesar 57,33 %. Analog kurkumin A, B dan C memiliki efek sinergitas dengan asam ferulat ditunjukkan dengan peningkatan aktivitas inhibisi enzim  $\alpha$ -amilase yaitu pada perbandingan konsentrasi analog kurkumin A: asam ferulat (4:1) yaitu 78,81%, analog kurkumin B: asam ferulat (4:1) yaitu 83,44 % dan pada analog kurkumin C: asam ferulat (8:1) sebesar 62,91%.

Kata kunci : asam ferulat, analog kurkumin, enzim  $\alpha$ -amylase, vanilin

***SYNTHESIS AND INHIBITION ASSAY OF CURCUMIN ANALOGS FROM VANILLIN TO  $\alpha$ -AMYLASE ENZYME AND SYNERGISM EFFECT WITH FERULIC ACID***

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**ABSTRACT**

Synthesis and inhibition assay of curcumin analogs from vanillin and ketones (cyclohexanone, cyclopentanone and acetone) to  $\alpha$ -amylase enzyme and their synergism effect with ferulic acid have been conducted. The synthesis of these three curcumin analogs involved Claisen-Schmidt condensation reaction between vanillin and cyclohexanone to yield 2,6-bis((E)-4-hydroxy-3-methoxybenzylidene)cyclohexa-1-on (curcumin analog A), with cyclopentanone to yield 2,5-bis((E)-4-hydroxy-3-methoxybenzylidene)cyclopenta-1on (curcumin analog B) and with acetone to yield 1,5-bis((E)-4-hydroxy-3-methoxyphenyl)-1,4-pentadiene-3-on (curcumin analog C) in acid condition. Inhibition test of curcumin analogs and their synergism effect with ferulic acid against  $\alpha$ -amylase enzyme were examined using iodine as reagent.

The results showed that curcumin analog A obtained as a yellow-green solid with 83.60% in yield and melting point at 176-178 °C. Curcumin analog B was obtained as a yellow-green colored solid with 90.34% in yield and melting point at 212-214 °C. Curcumin analog C obtained as a brown colored solid material with 66.25% in yield and melting point at 98-99 °C. Curcumin analog A and B (0.0625mM) showed an inhibition activity of  $\alpha$ -amylase enzyme respectively, 53.33% and 59.33%, while curcumin analog C (0.125 mM) showed inhibition activity of 57.33%. Curcumin analog A, B and C have synergism effect with ferulic acid because they showed higher inhibition activity against  $\alpha$ -amylase enzyme. Inhibition activity at concentration ratio of curcumin analog A: ferulic acid (4:1) was 78.81%, curcumin analog B: ferulic acid (4:1) was 83.44% and curcumin analog C: ferulic acid (8:1) was 62.91%.

Keywords:  $\alpha$ -amylase enzyme, curcumin analog, ferulic acid, vanillin