SINTESIS DAN STUDI SINERGI SENYAWA ANALOG KURKUMIN DENGAN ASAM FERULAT PADA UJI INHIBISI ENZIM α-AMILASE MENGGUNAKAN METODE IODIN

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INTISARI

Sintesis dan studi sinergi senyawa analog kurkumin dengan asam ferulat pada uji inhibisi enzim α-amilase dengan metode iodin telah dilakukan. Tujuan dari penelitian ini adalah melakukan sintesis senyawa analog kurkumin ((2E,5E)-2,5-bis(4-hidroksi-3-metoksibenzilidin)siklopentanon dan menentukan aktivitas inhibisinya terhadap enzim α-amilase serta sinerginya dengan asam ferulat.

Sintesis dilakukan dengan mereaksikan vanilin dengan siklopentanon melalui mekanisme Claisen–Schmidt selama 1 jam dan 2 jam sonikasi menggunakan katalis HCl pekat. Elusidasi struktur produk dilakukan dengan menggunakan spectrometer FTIR, *direct*-MS/MS, ^{1}H- dan ^{13}C-NMR. Pengujian analog kurkumin dan sinerginya dengan asam ferulat terhadap inhibisi enzim α-amilase dilakukan menggunakan metode pembentukan kompleks amilum-iodin.

Analog kurkumin yang dihasilkan untuk sonikasi selama 1 dan 2 jam berupa padatan serbuk berwarna kuning dengan titik leleh 211,3-212,2 °C. Rendemen hasil sintesis untuk sonikasi 1 dan 2 jam berturut-turut sebesar 72,72 dan 69,54%. Nilai rata-rata persentase inhibisi optimum pada uji analog kurkumin dan asam ferulat terhadap inhibisi enzim α-amilase berturut-turut sebesar 76,77 dan 97,68% pada konsentrasi 480 µg/mL. Berdasarkan hasil studi sinergi dapat disimpulkan bahwa aktivitas inhibisi optimum ditunjukkan pada komposisi analog kurkumin:asam ferulat (1:2) dengan persentase inhibisi sebesar 91,95% pada konsentrasi 360 µg/mL.

Kata kunci: analog kurkumin, amilum-iodin, α-amilase, sinergi, metode sonokimia

SYNTHESIS AND STUDY OF CURCUMIN ANALOGUE SYNERGY WITH FERULIC ACID ON α-AMILASE ENZYME INHIBITION ASSAY USING IODIN METHOD

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ABSTRACT

Synthesis and study of curcumin analogue synergy with ferulic acid on α-amylase enzyme inhibition assay using iodin method had been conducted. The aim of this research was to synthesize (2E.5E)-2.5-bis(4-hydroxy-3-methoxybenzylidene)cyclopentanone (curcumin analogue) and to determine its inhibition activity on α-amylase enzyme and its synergy with ferulic acid.

The synthesis was carried out by reacting vanillin with cyclopentanone using a concentrated HCl catalyst through sonochemical method for 1 and 2 hour(s). The product structure had been elucidated by FT-IR, *direct*-MS/MS, ^{1}H- and ^{13}C-NMR spectrometers. α-Amylase enzyme inhibition assay of curcumin analogue and the synergy with ferulic acid were performed by formation of amylum-iodine complex method.

Curcumin analogue was obtained as a yellow solid with melting point 211.3-212.2 °C for both 1 and 2 hour(s) of sonication. The yield for 1 and 2 hour(s) of sonication were 72.72 and 69.54% respectively. Average value of the optimum inhibition percentage on inhibition assay of curcumin analogue and ferulic acid against α-amylase enzyme respectively were 76.77 and 97.68% at concentration of 480 µg/mL. Based on the result of synergy study, it was concluded that the optimum inhibition activity showed at the composition of curcumin analogue:ferulic acid (1:2) with an inhibition percentage of 91.95% at concentration of 360 µg/mL.

Keywords: curcumin analogue, amylum-iodine, α-amylase, synergy, sonochemical method