

***SYNTHESIS OF MONOKETONE CURCUMIN ANALOGUE FROM  
4-HYDROXYBENZALDEHIDE AND THEIR ACTIVITY ASSAY  
AS INHIBITOR OF  $\alpha$ -GLUCOSIDASE ENZYME WORK THAT ISOLATED FROM  
ROTTEN RICE***

Tania Oktabri Kharisma  
14/373302/PPA/04785

**ABSTRACT**

The curcumin analogues **1** ((2E, 5E) -2,5-bis (4-hydroxybenzilidene) cyclopentanone), **2** ((2E, 6E) -2,6-bis (4- hydroxybenzilidene) cyclohexanone) and **3** (( 1E, 4E) -1,5-bis (4-hydroxyphenyl) penta-1,4-dien-3-one) have been synthesized from 4-hidroxybenzaldehyde (**1**). They have been tested as inhibitor of  $\alpha$ -glucosidase enzyme. Analogue curcumin **1** was synthesized by refluxing 4-hidroxybenzaldehyde and cyclopentanone in acid catalyst. Analogue curcumin **2** was synthesized from 4-hidroxybenzaldehyde and cyclohexanone, while curcumin analogue **3** was synthesized from 4-hidroxybenzaldehyde and acetone with ice bath. The structure of all products was elucidated by spectrometers FTIR to determine the functional groups, MS to determine the molecular weight and <sup>1</sup>H-NMR to determine the amount and the environment of the proton H. Analogue curcumin (**1-3**) products were tested as inhibitor of  $\alpha$ -glucosidase enzyme with quercetin as control.  $\alpha$ -glucosidase enzyme obtained by isolating it from rotting rice. The enzyme was precipitated by fractionation method using ammonium sulfate salts and then dialyzed. Concentrations of curcumin analogue and quercetin compounds used were 12.5; 10; 7.5; 5; 2.5 mM.

The results showed that curcumin analogues **1-3** have been successfully synthesized through Claisen-Schmidt condensation reaction with an acid catalyst. The yield of the resulting compound curcumin analogues **1** is 30.1%, curcumin analogues **2** amounted to 90.07% and curcumin analogues **3** amounted to 30.05%. The highest yield of curcumin analogues **2** are derived from the reaction of cyclohexanone with 4-hidroksibenaldehyda. The ability of curcumin analogues inhibition against  $\alpha$ -glucosidase activity of the compound curcumin analogues **1** highest concentration of 10 mM with a value of 94.90%, an analog of curcumin **2** at 73.25% at a concentration of 5 mM and curcumin analogues **3** of 54.14% at a concentration 7.5 mM. While the percent inhibition of quercetin highest was 71.97% at 10 mM. So that the highest ability of curcumin analog compounds found in curcumin analogue **1** and the results showed 23% higher when compared with quercetin.

Keywords: Analogue, Curcumin, Inhibitor,  $\alpha$ -Glucosidase



**SINTESIS ANALOG KURKUMIN MONOKETON BERBAHAN DASAR 4-HIDROKSIBENZALDEHID DAN UJI AKTIVITASNYA SEBAGAI INHIBITOR PADA KERJA ENZIM ALFA GLUKOSIDASE HASIL ISOLASI DARI BERAS LAPUK**  
TANIA OKTABRI K, Dr. Winarto Haryadi M.Si; Prof. Drs. Sabirin Matsjeh Ph.D

Universitas Gadjah Mada, 2016 | Diunduh dari <http://etd.repository.ugm.ac.id/>

**SINTESIS ANALOG KURKUMIN MONOKETON BERBAHAN DASAR 4-HIDROKSIBENZALDEHID DAN UJI AKTIVITASNYA SEBAGAI INHIBITOR PADA KERJA ENZIM  $\alpha$ -GLUKOSIDASE HASIL ISOLASI DARI BERAS LAPUK**

Tania Oktabri Kharisma

14/373302/PPA/04785

### INTISARI

Telah disintesis senyawa analog kurkumin **1** ((2*E*,5*E*)-2,5-bis(4-hidroksibenzilidin)siklopentanon), **2** ((2*E*, 6*E*)-2,6-bis(4-hidroksibenzilidin)sikloheksanon) dan **3** ((1*E*, 4*E*)-1,5-bis(4-hidroksifenil)penta-1,4-dien-3-on) dari 4-hidroksibenzaldehyda. Senyawa analog kurkumin **1-3** telah diuji aktivitasnya sebagai inhibitor enzim  $\alpha$ -glukosidase. Analog kurkumin **1** disintesis dengan merefluks 4-hidroksibenzaldehyda dan siklopentanon dengan katalis asam. Analog kurkumin **2** disintesis dengan mereaksikan 4-hidroksibenzaldehyda dan sikloheksanon, sedangkan analog kurkumin **3** disintesis dengan mereaksikan 4-hidroksibenzaldehyda dengan aseton menggunakan bantuan *ice bath*. Semua produk sintesis dianalisis strukturnya dengan spektrometer FTIR untuk mengetahui gugus fungsi, MS untuk mengetahui berat molekulnya dan <sup>1</sup>H-NMR untuk mengetahui jumlah serta lingkungan pada proton H. Senyawa analog kurkumin (**1-3**) hasil sintesis kemudian diuji aktivitasnya sebagai inhibitor enzim  $\alpha$ -glukosidase dengan kuersetin sebagai kontrol. Enzim  $\alpha$ -glukosidase diperoleh dengan mengisolasi dari beras lapuk. Enzim diendapkan dengan metode fraksinasi menggunakan bantuan garam ammonium sulfat dan kemudian didialisis. Konsentrasi yang senyawa analog kurkumin dan kuersetin yang digunakan adalah 12,5; 10; 7,5; 5; 2,5 mM.

Hasil penelitian menunjukkan bahwa senyawa analog kurkumin **1-3** telah berhasil disintesis melalui reaksi kondensasi Claisen-Schmidt dengan katalis asam. Rendemen yang dihasilkan untuk senyawa analog kurkumin **1** adalah sebesar 30,1%, senyawa analog kurkumin **2** sebesar 90,07% dan senyawa analog kurkumin **3** sebesar 30,05 %. Rendemen terbesar adalah senyawa analog kurkumin **2** yang berasal dari reaksi sikloheksanon dengan 4-hidroksibenzaldehyda. Kemampuan inhibisi analog kurkumin terhadap aktivitas  $\alpha$ -glukosidase pada senyawa analog kurkumin **1** tertinggi pada konsentrasi 10 mM dengan nilai sebesar 94,90%, analog kurkumin **2** sebesar 73,25 % pada konsentrasi 5 mM dan analog kurkumin **3** sebesar 54,14% pada konsentrasi 7,5 mM. Sedangkan persen inhibisi dari kuersetin yang tertinggi adalah 71,97 % pada 10 mM. Sehingga kemampuan tertinggi senyawa analog kurkumin terdapat pada analog kurkumin **1** dan hasil tersebut menunjukkan 23 % lebih tinggi bila dibandingkan dengan kuersetin.

Kata Kunci: Analog, Kurkumin, Inhibitor,  $\alpha$ -Glukosidase