SINTESIS DAN UJI ANTIBAKTERI SENYAWA TURUNAN 4'-HIDROKSIKALKON DAN PIRAZOLINA DARI SENYAWA TURUNAN BENZALDEHIDA

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13/353610/PPA/04209

INTISARI

Senyawa turunan 4'-hidroksikalkon, yakni (*E*)-3-(4-hidroksi-3-metoksifenil)-1-(4-hidroksifenil)-2-propena-1-on (**1a)**, (*E*)-3-(3,4-dimetoksifenil)-1-(4-hidroksifenil)-2-propena-1-on (**1b)** dan (*E*)-1-(4-hidroksifenil)-3-(4-metoksifenil)-2-propena-1-on (**1c**) telah disintesis berturut – turut dari 3 senyawa turunan benzaldehida yakni 4-hidroksi-3 metoksibenzaldehida (**a**); 3,4-dimetoksibenzaldehida (**b**) dan 4-metoksibenzaldehida (**c**), masing – asing direaksikan dengan 4-hidroksiasetofenon melalui reaksi kondensasi Claisen-Schmidt pada kondisi basa. Selanjutnya senyawa turunan pirazolina, yakni 4-(4-hidroksi-3-metoksifenil)-3-(4-hidroksifenil)-4,5-dihidro-1H-pirazol-1-karbaldehida (**2a)**, 5-(3,4-dimetoksifenil)-3-(4-hidroksifenil)-4,5-dihidro-1H-pirazol-1-karbaldehida (**2b)** dan 3-(4-hidroksifenil)-5-(4-metoksifenil)-4,5-dihidro-1H-pirazol-1-karbaldehida (**2c**) disintesis dari reaksi siklisasi senyawa turunan 4'-hidroksikalkon yang telah dihasilkan dengan 4-hidrazin monohidrat dan asam format. Semua senyawa turunan 4'-hidroksikalkon dan pirazolina hasil sintesis dikarakterisasi fisika - kimianya dan struktur kimia senyawanya dianalisis menggunakan spektrometer FT–IR, GC–MS, ^{1}H– dan ^{13}C–NMR serta aktivitas antibakteri diuji menggunakan metode sumuran.

Hasil reaksi kondensasi Claisen – Schmidt antara turunan benzaldehida (**a**, **b**, dan **c**) dan 4-hidroksiasetofenon dalam suasana basa NaOH 40% menggunakan pelarut metanol yang direfluk selama 18 jam menghasilkan senyawa turunan 4'-hidroksikalkon (**1a**, **1b** dan **1c**) dengan rendemen berturut – turut 96,20; 96,37 dan 96,87%. Hasil reaksi siklisasi antara senyawa turunan 4'-hidroksikalkon dengan hidrazin monohidrat dan asam format yang direfluk selama 18 jam mampu menghasilkan senyawa turunan pirazolina (**2a**, **2b**, dan **2c**) dengan rendemen berturut – turut sebesar 96,12; 89,94; dan 96,24%.

Berdasarkan hasil pengujian aktivitas antibakteri terhadap senyawa 4'-hidroksikalkon, senyawa **1a** mampu menghambat pertumbuhan bakteri *B. cereus* pada konsentrasi 600 – 1000 ppm. Senyawa **1b** dan **1c** mampu menghambat pertumbuhan bakteri *B. subtilis*, *B. cereus*, *E. coli* dan *S. flexneri* pada konsentrasi yang sama, rata – rata 600 – 1000 ppm, tetapi **1c** menunjukkan hasil yang lebih baik dibandingkan **1b**. Hasil uji antibakteri terhadap senyawa pirazolina **2a**, **2b**, dan **2c** tidak menunjukkan hasil positif terhadap bakteri, baik Gram positif maupun Gram negatif.

Kata Kunci: *Vanilin, Veratraldehida, p-Anisaldehida, 4'-Hidroksikalkon, Pirazolina, Antibakteri*

SYNTHESES AND ANTIBACTERIAL TEST OF 4'-HYDROXYCHALCONE AND PYRAZOLINE DERIVATIVES COMPOUND FROM BENZALDEHYDE DERIVATIVES COMPOUND

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ABSTRACT

Syntheses of 4'-hydroxychalcone (**1a**, **1b**, and **1c**), ie. (*E*)-3-(4-hydroxy-3-methoxyphenyl)-1-(4-hydroxyphenil)-2-propena-1-on (**1a)**, (*E*)-3-(3,4-dimethoxyphenil)-1-(4-hydroxyphenyl)-2-propena-1-on (**1b)** dan (*E*)-1-(4-hydroxyphenyl)-3-(4-methoxyphenyl)-2-propena-1-on (**1c**) were synthesized from benzaldehyde derivatives, ie. 4-hydroxy-3-methoxybenzaldehyde (**a**), 3,4-dimethoxybenzaldehyde (**b**), and 4-methoxybenzaldehyde (**c**) through reaction of Claisen – Schmidt condensation. Fuhermore, pyrazoline derivatives, ie. 4-(4-hydroxy-3-methoxyphenyl)-3-(4-hydroxyphenyl)-4,5-dihydro-1H-pyrazol-1-carbaldehyde (**2a)**, 5-(3,4-dimethoxyphenyl)-3-(4-hydroxyphenil)-4,5-dihydro-1H-pirazol-1-carbaldehyde (**2b)** dan 3-(4-hydroxyiphenyl)-5-(4-methoxyphenyl)-4,5-dihydro-1H-pyrazol-1-carbaldehyde (**2c**) were synthesized by cyclization reaction of the resulted 4'-hydroxychalcone derivatives with hydrazine monohydrate and formic acid. All of 4'-hydroxychalcone and pyrazoline derivatives compound were characterized by physicochemical and their chemical structures were established by FT–IR, GC–MS, ^{1}H– and ^{13}C–NMR spectrometer and the antibacterial activity were evaluated by well-difusion method.

The result of reaction through Claisen – Schmidt condensation between benzaldehyde derivatives (**a**, **b** and **c**) with 4-hydroxyacetophenone under NaOH 40% alkaline and methanol as solvent using reflux for 18 hours, obtained 4'-hydroxychalcone derivatives (**1a**, **1b**, and **1c**), repectively 96.20; 96.37 and 96.87%. The result of cyclization reaction between 4'-hydroxychalcone derivatives with hydrazine monohydrate and formic acid were produced by reflux for 18 hours and obtained pirazoline derivatives, respectively 96.12; 89.94 and 96.24%.

Based on the result of antibacterial test of 4'-hydroxychalcones compound, **1a** compound had capability for inhibition the growth of *B. cereus* bacteria at concentration of 600 – 1000 ppm. **1b** and **1c** compounds were showed their capability for inhibition all the growth of bacterias at concentration average on 600 – 1000 ppm, but **1c** compound found the result better than **1b**. The result of antibacteria test for pyrazoline derivatives (**2a**, **2b**, **2c)** didn't show positive result against the bacterias, both Gram positive and Gram negative bacteria.

Keywords: *Vanillin, Veratraldehyde, p-anisaldehyde, 4'-hydroxychalcone, Pirazoline, Antibacterial*