SINTESIS, UJI ANTIBAKTERI, DAN UJI SITOTOKSISITAS SENYAWA *N*-FENILPIRAZOLINA DARI 4-DIMETILAMINOBENZALDEHIDA DAN 4-KLOROASETOFENON

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INTISARI

Telah dilakukan sintesis turunan N-fenilpirazolina yaitu N-fenil-3-(4-klorofenil)-5-[4-(dimetilamino)fenil]-2-pirazolina melalui sintesis kalkon dan siklisasi beserta uji aktivitas antibakteri dan uji sitotoksisitasnya.

Sintesis kalkon dilakukan berdasarkan mekanisme reaksi kondensasi Claisen-Schmidt terhadap senyawa 4-dimetilaminobenzaldehida dan 4-kloroasetofenon pada temperatur kamar dengan katalis NaOH 40% (b/v). Selanjutnya kalkon direaksikan dengan fenilhidrazin dalam suasana basa NaOH 40% (b/v) sehingga meghasilkan N-fenilpirazolina. Produk hasil sintesis dielusidasi menggunakan spektrometer FTIR, GC-MS, ^{1}H dan ^{13}C-NMR. Senyawa N-fenil-3-(4-klorofenil)-5-[4-(dimetilamino)fenil]-2-pirazolina selanjutnya diuji aktivitas antibakterinya menggunakan metode difusi sumuran pada bakteri uji Gram positif (*Staphylococcus aureus*, *Shigella flexnerri*, dan *Basillus subtilis*) dan Gram negatif (*Salmonella typhimurium*, *Bacillus cereus*, dan *Escherichia coli*) serta DMSO 99% sebagai kontrol negatif dan tetrasiklin (100 ppm) sebagai kontrol positif. Senyawa tersebut kemudian diuji sifat sitotoksisitasnya menggunakan metode *Brine Shrimp Lethality Test* (BSLT) terhadap hewan uji larva *Artemia salina* untuk mendapatkan nilai *median lethal concentration* (LC_{50}) yang dihitung menggunakan analisis probit.

Reaksi kondensasi Claisen-Schmidt menghasilkan dimetilamino-kloro-kalkon yang berwujud padatan berwarna kuning dengan rendemen sebesar 63,74% sedangkan hasil siklisasi adalah N-fenilpirazolina yang berupa padatan hijau dengan rendemen 64,86%. Senyawa turunan N-fenilpirazolina menunjukkan aktivitas yang baik sebagai agen antibakteri pada bakteri Gram negatif. Aktivitas antibakteri terbaik pada konsentrasi terendah (100 ppm) ditunjukkan pada penghambatan pertumbuhan bakteri *Escherichia coli*. Uji sitotoksisitas senyawa turunan N-fenilpirazolina menunjukkan sifat toksik dengan LC_{50} sebesar 36,85 ppm.

Kata kunci : kalkon, N-fenilpirazolina, antibakteri, sitotoksisitas

SYNTHESIS, ANTIBACTERIAL ASSAY, AND CYTOTOXICITY ASSAY OF N-PHENYLPYRAZOLINE COMPOUND FROM 4-DIMETHYLAMINOBENZALDEHYDE AND 4-CHLOROACETOPHENONE

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ABSTRACT

Synthesis of N-phenylpyrazoline derivative, N-phenyl-3-(4-chlorophenyl)5-[4-(dimethylamino)phenyl]-2-pyrazoline via stepwise chalcone's synthesis followed by cyclization, and bioassay (i.e antibacterial and cytotoxicity assay) have been done.

Chalcone's synthesis based on Claisen-Schmidt's condensation mechanism between 4-dimethylaminobenzaldehyde and 4-chloroacetophenone was performed at room temperature in the presence of NaOH 40% (w/v). The chalcone was then reacted with phenylhydrazine under alkaline condition with NaOH 40% (w/v) catalyst to produce N-phenylpyrazoline. All of the products were analyzed using FTIR, GC-MS, ^{1}H and ^{13}C NMR spectrometers. N-phenyl-3-(4-chlorophenyl)-5-[4-(dimethylamino)phenyl]-2-pyrazoline was tested for its antibacterial activity using "well diffusion" methods on the Gram-positive bacteria (*Staphylococcus aureus*, *Shigella flexnerri*, and *Basillus subtilis*) and Gram-negative (*Salmonella typhimurium*, *Bacillus cereus*, and *Escherichia coli*) bacteria with DMSO 99% as negative control and tetracycline as positive control. This compound has also been tested to prove it's cytotoxicity activity by "Brine Shrimp lethality Test" methods on *Artemia salina* leech to gain medium lethal concentration value (LC_{50}) which was then calculated by probit statistical analysis.

Claisen-Schmidt's condensation's product yielded yellow solid of dimethylamino-chloro-chalcone in 63.74%, while the cyclization product produced N-phenylpyrazoline as green solid in 64.86% yield. N-phenylpyrazoline derivate showed good antibacterial activity, especially on the Gram-negative bacteria. The best antibacterial activity at the lowest concentration (100 ppm) showed the inhibition of *Escherichia coli's* bacterial growth. Cytotoxicity assay of N-phenylpyrazoline showed that this compound has a toxic level at LC_{50} 36,85 ppm.

Keywords: Chalcone, N-phenylpyrazoline, Antibacteria, Cytotoxicity