

ISOLASI DAN IDENTIFIKASI SENYAWA ALKALOID DARI KULIT BATANG DADAP MERAH (*Erythrina crista-galli*) SERTA UJI AKTIVITASNYA TERHADAP ENZIM *pbDHFR*

HANDAJANI, MASRUTJI

Pembimbing : Dr. Pratiwi Pudjiastuti, M.Si

ALKALOID

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RINGKASAN

Isolasi dan Identifikasi Senyawa Alkaloid dari Kulit Batang Dadap Merah (*E. crista-galli*) Serta Aktivitasnya Terhadap Enzim *pbDHFR*

Indonesia memiliki keanekaragaman hayati terbesar kedua di dunia setelah Brazil. Lebih dari 30 ribu spesies tanaman telah diketahui berkhasiat sebagai obat. Salah satunya adalah dadap merah (*E. crista-galli*). Beberapa jenis alkaloid telah berhasil diisolasi dari genus *Erythrina* yang erpotensi sebagai anti malaria. Malaria merupakan penyakit endemis atau hiperendemis di daerah tropis dan subtropis serta menyerang negara dengan penduduk padat. Salah satu masalah penting dewasa ini adalah resistensi *P falciparum* dan *P vivax* terhadap obat antimalaria. Bahkan laporan terakhir menyatakan sudah ditemukan kasus resistensi *P. malariae* terhadap obat antimalaria. Resistensi tersebut disebabkan oleh mutasi gen penyandi spesifik untuk enzim *Plasmodium dihydrofolate reductase (pDHFR)* di dalam *Plasmodium*. Antimalaria pirimetamin adalah inhibitor kompetitif pDHFR. Oleh karena itu isolasi senyawa alkaloid dari kulit batang dadap merah (*E. crista-galli*) yang diharapkan bisa menjadi kandidat anti malaria yang baru perlu dilakukan. Isolasi dilakukan dengan metode ekstraksi yang dilanjutkan dengan teknik kromatografi kolom. Identifikasi senyawa alkaloid dilakukan dengan metode spektroskopi IR dan NMR. Uji penghambatan parasit dilakukan secara *in vivo* terhadap *P. berghei* sedangkan uji inhibisi enzim dilakukan secara *in vitro* terhadap enzim *pbDHFR*.

Hasil penelitian menunjukkan bahwa telah berhasil diisolasi senyawa alkaloid dari kulit batang dadap merah (*E. crista-galli*) yang mempunyai kemampuan untuk menghambat pertumbuhan parasit *P. berghei* dan menginhibisi enzim *pbDHFR*. Hal ini ditunjukkan dengan nilai ED₅₀ sebesar 88,139 mg/kg berat badan dan nilai IC₅₀ terhadap enzim *pbDHFR* sebesar 43,722 µg/ml.

SUMMARY

Isolation and Identification of Alkaloid Compound from stembark of the Dadap Merah (*E. crista-galli*) and its activity against *pbDHFR* enzyme

Indonesia has second biggest diversity in the world after Brazil. More than 30 thousands species of plant are known to have a potential as medicine. One of them is dadap merah (*E. crista-galli*). A number of alkaloids have been successfully isolated from *Erythrina* genus which are potential for anti malaria. Malaria is endemic or hyperendemic disease in tropic dan subtropic regions and attact the countries with high population. The most important problem related with malaria is that resistance of *P. falciparum* and *P. vivax* on anti malaria drugs. The latest reports say that the resistance of those *Plasmodium* has being found. This resistance is caused by genetic mutation of *Plasmodium dihydrofolate reductase (pDHFR)* in *Plasmodium*. Pyrimethamine has been known as competitive inhibitor of *pDHFR*. Therefore, isolation of alkaloid from the stembark of dadap merah (*E. crista-galli*) which is potential for anti malaria is important.

Isolation was carried out by extraction method and followed by column chromatography. Identification of alkaloid was done by spectroscopic methods, IR and NMR. Parasite suppression test was carried out *in vivo* against *P.berghei*, meanwhile inhibition test was carried out *in vitro* against *pbDHFR* enzyme. Experimental results showed, that alkaloid from the stembark of dadap merah (*E. crista-galli*) is isolated successfully. This compound has ability to suppress *P. berghei* growth and inhibit *pbDHFR* ezyme with ED₅₀ as high 88.139 mg/kg body weight and IC₅₀ against *pbDHFR* enzyme is 43.722 µg/ml.

Isolation and Identification of Alkaloid Compound from Stembark of the Dadap Merah (*E. crista-galli*) and its activity against *pbDHFR* enzyme.

Abstract

The *Erythrina* genus is a member of Leguminocea family contains of erythrinan skeleton alkaloids. Many types of alkaloid from *Erythrina* have been successfully isolated and have a potential property as antimalaria. Based on preliminary screening of alkaloid on the stembark of *Erythrina crista-galli* showed the presence of alkaloid using Meyer test. The objectives of this research were isolation and identification of alkaloid compound from stembark of the dadap merah (*Erythrina crista-galli*), determination of its *in vivo* antimalaria activity against *P. berghei* and determination of its *in vitro* enzyme inhibition against *pbDHFR*. The alkaloid was extracted using acid-base method and isolation was carried out by column chromatography technique and thin layer chromatography. Identification of alkaloid compound was carried out by ¹H-NMR, ¹³C-NMR and

IR techniques. *In vivo* test against *P. berghei* was carried out as follow: after infection with *P. berghei*, as many as 30 female mice were divided into six treatment groups. One group of mice was not treated by anything, five another groups were dosed by pirimethamine of 25 mg/kg body weight and by alkaloid extract of 25, 50, 75 and 100 mg/kg body weight. *In vitro* test against *pbDHFR* was carried out by treating *pbDHFR* with 25, 50, 75 and 100 mg/mL of alkaloid extract. Inhibition activity was measured spectrophotometrically at 340 nm. The $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and IR data interpretation, as well as comparison with spectroscopic isolated alkaloid from the other *Erythrina* genus data indicated that the isolated alkaloid is considered as 8-oxo-erythraline. *In vivo* test against *P. berghei* indicated that ED_{50} of alkaloid extract is 88.139 mg/kg body weight. Meanwhile, inhibition test on *pbDHFR* enzyme showed that IC_{50} is 43.722 $\mu\text{g/mL}$.

