THE EFFECTIVITY ANNONA MURICATA TO REDUCE MIF LEVEL AND IMPROVE ERYTHROCYTE NUMBER (STUDY IN CEREBERAL MALARIA PHASE OF SWISS MICE)

Thesis
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Master of Biomedical Sciences

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APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is my own work and has not been submitted in any from for another degree or diploma at any university or other institution of tertiary education, there are no elements belonging plagiarism forth in Decree No 17 of 2010. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of reference is given.

Semarang, August, 2015

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FOREWORD

Assalamu'alaikum Wr. Wb.

Praise to Allah Almighty for all grace and guidance that thesis with the title **"The Effectivity *Annona muricata* to Reduce MIF Level and Improve Erythrocyte Number (Study in Cereberal Malaria Phase of Swiss Mice)"** can be resolved. This thesis is structured to meet one of the requirements to obtain a Master degree in Biomedical Sciences (MSi. Med) in the field of Immunology at the Faculty of Medicine, University of Diponegoro.

I realized that without the help and guidance of the various parties, it is not easy for me to finish this thesis. Therefore, on this occasion, the author would like to express respect and gratitude as possible to:

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With limited knowledge, the authors expect criticism and constructive suggestions for the perfection of this thesis.

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Wassalamualaikum Wr. Wb.

Semarang, August, 2015

Writer

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LIST OF ABBREVIATIONS

CD4 : *Cluster differentiation 4*

CD36 : *Cluster differentiation 36*

CM : *Cerebral malaria*

ELAM : *Endothelial leukocyte adhesion molecule*

EPO : *Erythropoietin*

HDP : *High density parasitemia*

ICAM-1 : *Intercellular adhesion molecule 1*

IFN-γ : *Interferon-gamma*

IL-4 : *Interleukin 4*

IL-12 : *Interleukin 12*

KAHRP : *Knob-associated histidine-rich protein*

MIF : *Migration inhibitory factor*

PfEMP-1 : *P. falciparum erythrocyte membrane protein-1*

RBCs : *Red blood cells*

SMA : *Severe malaria anemia*

Th 1 : *T helper cells type 1*

TNF-α : *Tumor necrosis factor alpha*

TSP : *Thrombospondin*

VCAM : *Vascular adhesion molecule*

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ABSTRACT

THE EFFECTIVITY ANNONA MURICATA TO REDUCE MIF LEVEL AND IMPROVE ERYTHROCYTE NUMBER (STUDY IN CEREBERAL MALARIA PHASE OF SWISS MICE)

Khalid M. A. Abdulaziz, RA. Kisdjamiatun, Tri Nur Kristina

BACKGROUND: Severe malaria by parasites *Plasmodium falciparum* is a vast majority of malaria associated morbidity and mortality. MIF involve in the pathogenesis of malarial anemia because it inhibits erythropoiesis. *Annona muricata* at a dose of 200 mg/kg and 400 mg/kg may act as anti-inflammatory and antinosiseptik with reduced volume of exudate and leukocyte migration This research to prove *Annona muricata* can reduce MIF level and improve erythrocyte number in swiss albino mice inoculated with *Plasmodium berghei ANKA*.

METHOD: Study design was experimental study. 36 swiss mice which devided into 6 groups. K(-) is healthy mice, P1 and P2 were group without inoculated PbA with *A. muricata* dosage 100 and 150 mg/kg BW. K(+) is group with inoculated PbA, P3 and P4 were group with inoculated PbA and *A. muricata* dosage 100 and 150 mg/kg BW. Blood was taken from eyes mice for erythrocyte. Level of MIF measure with spleen culture.

RESULT: Mean of MIF level K(-): 29.64; P1: 39.05; P2: 62.27; K(+): 46.79; P3: 57.36; and P4: 36.09. Mean number of erythrocyte K(-): 9,775,000; P1: 9,288,000; P2: 9,900,000; K(+): 6,376,000; P3: 8,028,333; and P4: 7,548,333.

CONCLUSION: There is no significant reducing of MIF level and no significant increase erythrocyte count in those PbA inoculated swiss albino mice which are treated with *Annona muricata* Linn extract during cerebral malaria phase than PbA inoculated mice that are untreated. There is no difference of effective dose of *Annona muricata* Linn extract to increase erythrocyte count of swiss albino mice inoculated with PbA.

Keywords: *Annona muricata*, *P. berghei* ANKA, Erythrocyte, MIF.

ABSTRAK

PENGARUH SIRSAK UNTUK MENGURANGI LEVEL MIF DAN MENINGKATKAN JUMLAH ERITROSIT (STUDI DI FASE CEREBERAL MALARIA MENCIT SWISS)

Khalid M. A. Abdulaziz, RA. Kisdjamiatun, Tri Nur Kristina

LATAR BELAKANG: Malaria parah oleh parasit *Plasmodium falciparum* merupakan mayoritas malaria yang terkait dengan morbiditas dan mortalitas. MIF terlibat dalam patogenesis anemia malaria karena menghambat eritropoiesis. Annona muricata pada dosis 200 mg / kg dan 400 mg / kg dapat bertindak sebagai anti-inflamasi dan antinosiseptik dengan volume yang berkurang dari eksudat dan leukosit migrasi Penelitian ini membuktikan sirsak dapat mengurangi tingkat MIF dan meningkatkan jumlah eritrosit pada tikus albino swiss diinokulasi dengan *Plasmodium berghei* ANKA.

METODE: Desain penelitian adalah studi eksperimental. 36 tikus swiss yang terbagi menjadi 6 kelompok. K (-) adalah tikus yang sehat, P1 dan P2 adalah kelompok tanpa diinokulasi PbA dengan dosis *A. muricata* 100 dan 150 mg / kg BB. K (+) adalah grup dengan diinokulasi PbA, P3 dan P4 adalah kelompok dengan diinokulasi PbA dan dosis *A. muricata* 100 dan 150 mg / kg BB. Darah diambil dari mata tikus untuk eritrosit. MIF mengukur dengan budaya limpa.

HASIL: Rata-rata MIF K(-): 29,64; P1: 39,05; P2: 62,27; K(+): 46,79; P3: 57,36; and P4: 36,09. Rata-rata jumlah eritrosit K(-): 9.775.000; P1: 9.288.000; P2: 9.900.000; K(+): 6.376.000; P3: 8.028.333; and P4: 7.548.333.

KESIMPULAN: Secara signifikan MIF tidak menurun dan tidak ada peningkatan eritrosit secara signifikan pada tikus albino swiss yang diinokulasi dengan PbA dan diberikan ekstrak *A. muricata* Linn selama fase malaria cerebral dari PBA diinokulasi tikus yang tidak diobati. Tidak ada perbedaan dari dosis efektif ekstrak *Annona muricata* Linn untuk meningkatkan jumlah eritrosit tikus albino swiss diinokulasi dengan PbA.

Kata kunci: *Annona muricata*, *P. berghei* ANKA, eritrosit, MIF.