THE EFFECTIVITY OF ANNONA MURICATA TO REDUCE IL-12 LEVEL AND NUMBER OF LEUKOCYTE AND IMPROVE MONOCYTE PERCENTAGE

(STUDY IN CEREBRAL MALARIA OF SWISS ALBINO MICE)

Thesis
For requirements master degrees

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 Information derived from the published or unpublished work of others has been acknowledged in the text and a list of reference is given.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 of *Annona Muricata* to Reduce IL-12 Level and Number of Leukocyte and Improve Monocyte Percentage (Study in Cerebral Malaria of Swiss Albino 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.

Finally, the authors hope that Allah is pleased to reply to all the good of all those who have helped this thesis. Hopefully, this thesis can be useful for the development of science, especially Biomedicscience.

Wassalamualaikum Wr. Wb.

Semarang, August, 2015

Writer

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LIST OF ABBREVIATIONS

APCs	: *antigen presenting cells*
CD4	: *cluster differentiation 4*
CD8	: *cluster differentiation 8*
CD30	: *cluster differentiation 30*
CM	: *Cerebral Malaria*
CTL	: *Cytotoxic T lymphocytes*
DCs	: *Dendritic cells*
EBV	: *Epstein-Barr virus*
ECM	: *Experiment cerebral malaria*
IFN-γ	: *Interferon-gamma*
IL-2	: *Interleukin 2*
IL-4	: *Interleukin 4*
IL-10	: *Interleukin 10*
IL-12	: *Interleukin 12*
MLR	: *Monocyte-Lymphocyte Ratio*
NK	: *Natural killer*
NLR	: *Neutrophil-lymphocyte Ratio*
PbA	: *Plasmodium berghei ANKA*
PF4	: *Platelet Factor 4*
PBMC	: *Peripheral blood monocular cells*
PHA	: *phytohemagglutinin*
Th 1	: *Type 1T helper cells*

TNF-α : *Tumor necrosis factor alpha*

WBCs : *White blood cells*

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ABSTRACT

THE EFFECTIVITY OF ANNONA MURICATA TO REDUCE IL-12 LEVEL AND NUMBER OF LEUKOCYTE AND IMPROVE MONOCYTE PERCENTAGE (STUDY IN CEREBRAL MALARIA OF SWISS ALBINO MICE)

Walid Faraj A. Naamat, RA. Kisdjamiatun, Tri Nur Kristina

BACKGROUND: Many researches were documented through the investigation on ethnopharmalogical use of *Annonaceae* plants to treat malaria including *Annona muricata.* This research to prove that *Annona muricata* treatment reduce IL-12 production and the number of leukocytes and percentage of monocyte during CM phase 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 the eyes of mice for leukocyte and monocyte. IL-12 taken from the spleen detected using the ELISA method.

RESULT: Mean of IL-12: K(-): 0.7646; P1: 4.9834; P2: 3.0402; K(+): 3.5989; P3: 3.3647; and P4: 4.9558. Mean number of leukocyte: K(-): 12,550; P1: 9,620; P2: 13,660; K(+): 21,600; P3: 20,483; and P4: 26,433. Mean of monocyte percentage: K(-): 6.33; P1: 5.40; P2: 8.20; K(+): 4.80; P3: 3.50; and P4: 5.50.

CONCLUSION: The extract of *A. muricata* and PbA inoculation significantly affect the levels of IL-12. The extract of *A. muricata* and PbA inoculation significantly affect the number of leukocytes. The extract of *A. muricata* and PbA inoculation significantly affect the percentage of monocytes.

Keywords: *Annona muricata*, *P. berghei* ANKA, IL-12, Leukocyte, Monocyte.

ABSTRAK

PENGARUH SIRSAK UNTUK MENURUNKAN LEVEL IL-12 DAN JUMLAH LEUKOSIT DAN MENINGKATKAN PERSENTASE MONOSIT (STUDI PENYAKITMALARIA SEREBRAL PADA SWISS ALBINO MICE)

Walid Faraj A. Naamat, RA. Kisdjamiatun, Tri Nur Kristina

LATAR BELAKANG: Banyak penelitian yang didokumentasikan mengenai penggunaan ethnopharmalogical tanaman *Annonaceae* untuk mengobati malaria termasuk *Annona muricata*. Penelitian ini membuktikan bahwa *Annona muricata* mengurangi produksi IL-12 dan jumlah leukosit dan persentase monosit selama fase CM 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 leukosit dan monosit. IL-12 yang diambil dari limpa dideteksi dengan menggunakan metode ELISA.

HASIL: Rata-rata IL-12: K(-): 0.7646; P1: 4.9834; P2: 3.0402; K(+): 3.5989; P3: 3.3647; and P4: 4.9558. Rata-rata leukosit: K(-): 12,550; P1: 9,620; P2: 13,660; K(+): 21,600; P3: 20,483; and P4: 26,433. Rata-rata persentase monosit: K(-): 6.33; P1: 5.40; P2: 8.20; K(+): 4.80; P3: 3.50; and P4: 5.50.

KESIMPULAN: Ekstrak *A. muricata* dan PbA inokulasi secara signifikan mempengaruhi tingkat IL-12. Ekstrak *A. muricata* dan PbA inokulasi secara signifikan mempengaruhi jumlah leukosit. Ekstrak *A. muricata* dan PbA inokulasi secara signifikan mempengaruhi persentase monosit.

Kata kunci: *Annona muricata, P. berghei* ANKA, IL-12, Leukosit, Monosit.