THE EFFECT OF *Annona muricata* TO INCREASE CXCL10 IN THE BRAIN STUDY IN CEREBRAL MALARIA OF SWISS MICE

PENGARUH ANNONA MURICATA UNTUK MENINGKATKAN CXCL10 DI OTAK STUDI PADA SEREBRAL MALARIA SWISS ALBINO MICE

Thesis
For requirements master degrees

Master of Biomedical Sciences

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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 Information derived from the published or unpublished work of others has been acknowledged in the text and a list of reference is given.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, June, 2016

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FOREWORD

Assalamu'alaikum Wr. Wb.

Praise to Allah Almighty for all grace and guidance that thesis with the title **"The Effect of *Annona muricata* to Increase CXCL10 in The Brain Study in Cerebral Malaria 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.

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Semarang, June, 2016

SUMIA M. ALI MATUG

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LIST OF ABBREVIATIONS

APC	: antigen presenting cells
BBB	: blood brain barrier
CM	: cerebral malaria
CSF	: cerebral spinal fluid
CXCR3	: (C-X-C motif) receptor 3
ECM	: experimental cerebral malaria
GPI	: glikosilfosfatidilinasitol
HRP-1	: histidine-rich protein-1
ICAM-1	: Intercellular adhesion molecule-1
IFN-γ	: interferon-gamma
IL-1	: interleukin-1
MMP	: Matrix metalloproteinases
NK	: natural killer
NKT	: natural killer T
NO	: nitric oxide
PbA	: *P. berghei* ANKA
pRBC	: parasitized red blood cell
RES	: reticulo endothelial system
RPE	: retinal pigment epithelial
TNF-α	: tumor necrosis factor-alpha

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ABSTRACT

THE EFFECT OF *ANNONA MURICATA* TO INCREASE CXCL10 IN THE BRAIN STUDY IN CEREBRAL MALARIA OF SWISS MICE

Sumia M. Ali Matug

BACKGROUND: Malaria is a common and life-threatening disease in many tropical and subtropical areas. A study of cerebral malaria (CM) in children demonstrated that out of 36 biomarkers, only CXCL10 was serum marker independently associated with CM mortality. Objective of this study is to prove that *A. muricata* may decrease the CXCL10 in *Plasmodium berghei* ANKA (PbA) inoculated swiss albino mice.

METHOD: Study design was experimental study, by used Randomized Post test Only Control Group Design. Thirthy six swiss mices which divided into 6 groups. C(-) is healthy mice, C(+) is group with inoculated PbA, X_1 (non inoculated PbA and *A. muricata* dosage 100 mg/kg BW), X_2 (non inoculated PbA and *A. muricata* dosage 150 mg/kg BW), X_3 (inoculated PbA and *A. muricata* dosage 100 mg/kg BW), X_4 (inoculated PbA and *A. muricata* dosage 150 mg/kg BW).

RESULT: Significant difference was found among the studied groups (p=0.003). Positive control group was signiticantly expressed lower CXCL10 than those of healthy groups without or with *A. muricata* treatment (negative control, p=0.008; X_1, p=0.045; or P2, p=0.012). X_3 group showed CXCL10 expression comparable with those of healthy mice (negative control, X_1 and X_2), meanwhile the expression was significantly higher than positive control and X_4 groups (p=0.012 and p=0.028, respectively). X_4 group showed CXCL10 expression significantly lower than healthy groups which were negative control and P2 groups (p=0.011 and p=0.016, respectively).

CONCLUSION: *Annona muricata* can't decrease CXCL10 in PbA inoculated swiss albino mice.

Keywords: *Annona muricata*, *P. berghei* ANKA, CXCL10.

ABSTRAK

THE EFFECT OF *ANNONA MURICATA* TO INCREASE CXCL10 IN THE BRAIN STUDY IN CEREBRAL MALARIA OF SWISS MICE

PENGARUH *ANNONA MURICATA* UNTUK MENINGKATKAN CXCL10 DI OTAK STUDI PADA SEREBRAL MALARIA SWISS ALBINO MICE

Sumia M. Ali Matug

LATAR BELAKANG: Malaria adalah penyakit yang umum dan mengancam jiwa di banyak daerah tropis dan subtropis. Sebuah studi dari cerebral malaria pada anak-anak menunjukkan bahwa dari 36 biomarker, hanya CXCL10 adalah penanda serum independen terkait dengan kematian CM. Penting untuk meneliti tentang CXCL10. Tujuan dari penelitian ini adalah untuk mengetahui *A. muricata* dapat menurunkan CXCL10 pada tikus swiss albino yang diinokulasi oleh *Plasmodium berghei* ANKA (PbA).

METODE: Rancangan penelitian adalah penelitian eksperimental, dengan menggunakan Acak Posting uji Hanya Control Group Design. Tiga puluh enam tikus swiss albino yang terbagi menjadi 6 kelompok. C(-) adalah tikus yang sehat, C(+) adalah grup dengan diinokulasi PbA, X_1 (diinokulasi PbA dan ekstrak A. muricata 100 mg / kg BB), X_2 (tidak diinokulasi PbA dan ekstrak A. muricata 150 mg / kg BB), X_3 (diinokulasi PbA dan ekstrak A. muricata 100 mg / kg BB), X_4 (diinokulasi PbA dan ekstrak A. muricata 150 mg / kg BB).

HASIL: Perbedaan yang signifikan ditemukan antara kelompok dipelajari ($p = 0,003$). Kelompok kontrol positif signiticantly CXCL10 lebih rendah dibandingkan kelompok sehat tanpa atau dengan pengobatan A. muricata (kontrol negatif, $p = 0,008$; X_1, $p = 0,045$; atau X_2, $p = 0,012$). Kelompok X_3 menunjukkan ekspresi CXCL10 sebanding dengan tikus-tikus yang sehat (kontrol negatif, X_1 dan X_2), sementara ekspresi secara signifikan lebih tinggi dari kontrol dan X_4 kelompok positif ($p = 0,012$ dan $p = 0,028$, masing-masing). Kelompok X_4 menunjukkan ekspresi CXCL10 signifikan lebih rendah daripada kelompok yang sehat yang kontrol dan X_2 negatif kelompok ($p = 0,011$ dan $p = 0,016$, masing-masing).

KESIMPULAN: *Annona muricata* tidak dapat menurunkan CXCL10 pada tikus swiss albino yang diinokulasi oleh PbA.

Kata kunci: *Annona muricata, P. berghei* ANKA, CXCL10.