

Malaria Infection Effect to Haemoglobin and Haematocrit in Pregnant *Mus Musculus*

Istiana¹, Widya Nursantari², Edi Hartoyo³, Meitria Syahadatina Noor²

¹Department of Parasitology and Microbiology, ²Department of Public Health, ³Department of Pediatric, Faculty of Medicine, Lambung Mangkurat University

Abstract

Malaria is a disease that is caused by Plasmodium Sp. And infected by Anopheles mosquitos. Kalimantan is one of endemic places for malaria. Prevalence of malaria is 2-76% depent to the places. Effect of malaria to pregnant women can be anemia, renal failure, cerebral oedema and death. Prevamence of anemia because of malaria in pregnant women is about 3-15%. This research was done by using animal model to show malaria in pregnant. Goal of this research was to analyze malaria infection effect to haemoglobin and haematocrit in pregnant *Mus musculus*. Research design was experimental using posttest only with control group design. It consisted of K0 for control (20 samples) and K1 for infected group (19 samples). Pregnant *Mus musculus* was injected *P. berghei* to infect plasmodium using 0,2 ml infected serum intraperioteal in the first day of pregnant. *Mus musculus* was terminated in 19th day of pregnant and took cardial blood to examine Hb and Ht of pregnant *Mus musculus*. The result was Hb level mean for K0= 12,69 gr/dl and K1=12,832 dr/dl. Mean of Ht for K0=38,070% and K1=38,495%. Statistical anayzes used U-Mann Whitney test, with p value for Hb level was 0,574 and Ht was 0,574. The conclusion was malaria infection could not effect yet to Hb dan Ht level in pregnant *Mus musculus*.

Keywords: Hb, Ht, malaria, pregnant.

Introduction

Malaria is caused by Plasmodium Sp. distribution of this disease is in tropical and subtropical countries. Kalimantan is one of malaria endemic region.^{1,2,3}

Malaria can infect all of group of human, and pregnant women are high risk group to be infected. Malaria in pregnant is various in many places, between 2-76%.⁴Duka's research (2015) stated that 7 pregnant women suffered from malaria among 125 malaria patients.⁵

Malaria infection in pregnant women can increase morbidity and mortality of mother and foetus. Effects of malaria to mother's health are anemia, renal failure, lung oedema, cerebral malaria and death. Effects of malaria to foetus are abortion, premature delivery, low birthweight, and infant death. Anemia in pregnant women because of malaria was about 3-15%, low birthweight was about 13-70%, and neonates death was about.⁶

Pregnant can cause hormonal changes. Progesterone increases in pregnant. Progesterone inhibits T-lymphocyte activation in fighting antigen stimulation. That immunity suppression in pregnant can cause malaria paracite enter to body. Malaria infection will destroy erythrocyte.⁵Damaged erythrocyte will make low Hb level an become

Corresponding Author:
Meitria Syahadatina Noor
Email: drmeitria@ulm.ac.id

anemia. Low concentration of Hb level will influence Ht.

Until now, effect of malaria infection to mother and foetus' health is still in research. This research is a basic research that can be used to advanced research in prevention and treatment of malaria in pregnant women. So, this is a basic consideration to decrease morbidity and mortality mother and foetus. Malaria infection was given to *Mus musculus* and then effect of malaria was observed in haemoglobin (Hb) and haematocrite (Ht). This research's goal was to analyze effect of malaria to mother's Hb and Ht level.

Method

This research used true experimental with posttest only with a control group design. Research groups consisted of K0 (control group) and K1 (infected group). Subjects of research were 20 female *Mus musculus* control group and 19 in infected group. Location of research was in biochemistry laboratory,

Faculty of Medicine, Lambung Mangkurat University.

Independent variable was infection of malaria in pregnant. Dependent variables were Hb and Ht level. Health *Mus musculus* was healthy, 12 weeks, 200-250 mg, active, no wound, clear eyes.

Mus musculus was mated by injecting 5 IU PMSG intraperitoneal, next 48 hours was injected by 5 IU HCG intraperitoneal and then was mated by male ones. Next 17 hours they will be separated and called as day 0 of pregnant. Malaria infection was given by injecting 10^7 *Plasmodium berghei* in 0,2 ml of blood in K1. Induction was on day 1 of pregnant. *Mus musculus* was terminated on day 19 of pregnant, and then blood from heart was taken to check Hb and Ht.

Result And Discussion

This research was done on 20 *Mus musculus* of control and 19 *Mus musculus* of infected group. The results of Hb and Ht level is this table:

Table 1. Hb and Ht level in *Mus musculus* pregnant

No	Variables	Group	Mean ± Sd	P Value
1	Hb level	K0	12.690 ± 1,3860	0,574
		K1	12,832 ± 1,8986	
2	Ht level	K0	38,070 ± 4,1579	0,574
		K1	38,495 ± 5,6957	

Table 1 shows about Hb and Ht level. Mean of Hb level in K1 is higher than K0. Mean of Ht level in K1 is higher also than K0. Normality test was done and the results was not in normal distribution for K1, so the analyzes test used U-Mann Whitney Test with 95% significant level.

Both of variables showed $> 0,05$ p value. It meant there was no significant different between K0 and K1. So, there was no effect of malaria infection to Hb and Ht level of pregnant *Mus musculus*.

Pregnant condition has weak immunity, and it makes malaria will infect easily. Malaria infection causes oxidative stress and inflammation, and then

it can damage erythrocyte. In this research, malaria infection could not effect Hb and Ht level statistically. Possibility, it is caused by mechanism of body to again infection. Good mechanism will produce enough anti inflammation and anti oxidant to again malaria infection. This condition can cause no significant effect to erythrocyte.

Some researches stated that antioxidant can decrease parasitemia and recover cells in spleen. Antioxidant also can manage inflammation in malaria infection.⁷This fact as a basic mechanism why there was no significant differences of data in this research.

Plasmodium that causes malaria infects erythrocyte. The effect is osmotic auto-hemolysis. Erythrocyte's duration of life become shorter and makes anemia.⁸ Malaria infection makes body produces inflammation cytokine. High level of inflammation induces oxidative stress. This process damages erythrocyte's membrane and then it become rupture and induces anemia.⁷Low of erythrocyte number can induce its production. If production of erythrocyte is too much, it can increase haematocrit.⁹

Conclusion and Acknowledgment

The conclusion of this research is malaria infection could not affect Hb and Ht level in pregnant *Mus musculus*. We would to say thank you for Faculty of Medicine, Lambung Mangkurat University, as the source of this research's fund.

Declaration of Conflicting Interest

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Ethical Clearance: This research has been declared ethically worthy by the ethics committee of the medical faculty of the Lambung Mangkurat University

References

1. Direktorat Pengendalian Penyakit Bersumber Binatang. (2011). Epidemiologi malaria di Indonesia. *Buletin Jendela Data dan Informasi Kesehatan*. Triwulan I. 1-17.
2. Hakim L. (2011). Malaria: Epidemiologi dan diagnosis. *Aspirator*. **3 (2)**. 107-116.
3. Rusjdi SR. (2012). Malaria pada masa kehamilan. *Majalah Kedokteran Andalas*. **2 (36)**. 173-178.
4. Brabin BJ., (1983). An analysis of malaria in pregnancy in Africa. *Buletin WHO*. **61 (6)**. 1005-1016.
5. Duka R.S., Santoso N. E., dan Katiandhago D. (2015) dalam Katiandhago dan Donsu (2018). Analisis factor risiko kejadian malaria pada ibu hamil di Puskesmas Manganitu Kabupaten Kepulauan Sangihe. *Higiene*. **4 (2)**. 109-120.
6. Suparman E. dan Suryawan A. (2004). Malaria pada kehamilan. *JKM*. **4 (1)**. 21-40.
7. Triajayanti A. and Oktarlina R.Z. (2017). Peran antioksidan pada buah merah dan buah delima (*Pandanus conoideus*) terhadap splenomegaly pada penderita malaria. *Medula*. **7 (4)**. 94-100.
8. Susilawati, Sennang N., Naid T., dan Attamimi F. (2013). Kadar hemoglobin dan densitas parasite pada penderita malaria di Lombok tengah. *JST Kesehatan*. **3 (3)**. 298-304.
9. Hutajulu N.I., Taudjidi A.A., and Fridayenti. (2015). Gambaran hematocrit pada pasien stroke iskemik di RSUD Arifin Ahmad Provinsi Riau. *JOM FK*. **2 (1)**. 1-10.