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Acetylcholinesterase Activity and Histopathological Effects of Caffeine in Kidney of *Plasmodium berghei* ANKA-infected ICR mice

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Structured Abstract

Background: In 2022, the World Health Organization (WHO) reported of approximately 249 million cases of malaria and 608,000 deaths caused by the disease across 85 countries worldwide (World Health Organization, 2023) Malaria, an inflammatory related disease has become more concerning since the standard antimalarial drug such as chloroquine and artemisinin-based combination therapies (ACTs) have built resistance towards the drug. Therefore, this study is an attempt to explore natural sources potential of caffeine as antimalarial agent considering it has anti-inflammatory property.

Methods: The methodology involved the determination of AChE using Ellman *et al.* (1961) and histopathological effects of caffeine in kidney of *Plasmodium berghei* ANKA-infected ICR mice. In this study, twenty-eight male ICR mice, 8- 10 weeks old and weighed 25- 35 g were involved. Animals were then randomly assigned into four different groups of seven mice each (n=7), consisting of normal control, *P. berghei* ANKA-infected, infected chloroquine-treated, and infected caffeine-treated. Caffeine was administered at 5 mg/kg body weight by intraperitoneal injection (i.p) to the *P. berghei* ANKA-infected ICR mice for four consecutive day. The kidneys were collected on day four post-infection and underwent histopathological analysis and AChE activity measurement by using Ellman *et al*. (1961) method.

Results: The results showed decreased in AChE activity in kidney of infected mice upon malarial infection. Caffeine treatment with 5 mg/kg b.w. was able to elevate kidney AChE activity level (3.582 ± 0.107 U) as compared to *P. berghei* ANKA-infected ICR mice (3.278 ± 0.094 U). Histopathological study revealed the reduction of hemozoin and sequestration of PRBC in kidney of infected caffeine-treated as compared to *P. berghei* ANKA-infected ICR mice.

Conclusion: As a conclusion, caffeine was able to reduce malarial infection in kidney of ICR mice. This study shows caffeine possesses antimalarial property, which is comparable to standard drug, chloroquine. Hence, caffeine is a potential candidate to be developed as anti-malarial drug.

Keywords: Malaria, Acetylcholinesterase Activity, Histopathological Effects, Caffeine, *P. berghei* ANKA

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