

Anti-malarial Activity of Total Saponins from *Terminalia avicennioides* and Its Effect on Liver and Haematological of Infected Mice

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Abstract:

Background: *Terminalia avicennioides* is one of the medicinal plants commonly use traditionally, hence this study examined the effect of total saponins from *Terminalia avicennioides* leaves on malaria parasite, haematological and liver in mice infected with *Plasmodium berghei*.

Methodology: Fifty Swiss albino mice (n=10) were divided into five groups. Groups 1, 2 and 3 were infected with malaria parasite and treated with 100, 200 mg/kg of saponins, and 5 mg/kg artemether-lumefantrine respectively (positive control). Group 4 was infected but not treated (negative control), group 5 was neither infected nor treated (normal control). The treatment was administered orally for four days.

Results: The parasite clearance was higher in the positive control group (80%) than in the group treated with 100 and 200 mg/kg of saponins (43.5% and 56.95%) respectively. White blood cell and lymphocyte count were higher in the group treated with 100 and 200 mg/kg of saponins. The red blood cell and haemoglobin levels were significantly reduce ($p < 0.05$) in the group treated with 200 mg/kg of saponins than in all other groups. The platelet count (PLT) was lowest in the group treated with 100 mg/kg body weight of saponin. There was a significant reduction in ($p < 0.05$) in the aspartate transaminase (AST) and Alanine transaminase (ALT) levels in the normal control than in other groups.

Conclusion: The study concluded that the antiplasmodial activity of total saponin of *T. avicennioides* and its effects on haematology and liver dysfunction are dose related. It is

therefore recommended that low dosage of saponin from *T. avicennioides* should be used for the treatment of malaria.

Keywords:

Malaria; Saponin; Medicinal plant; *Terminalia avicennioides*; Liver dysfunction; Haematology

Introduction:

Malaria has been a menace to the health conditions of both rural and urban populations in Nigeria [1]. Although, it is a global epidemic, but the incidence and severity are higher in the tropics especially in the sub-Saharan Africa, where pregnant women and children are the most susceptible groups [2]. In 2013, it caused an estimated 198 million clinical cases and 584,000 deaths [3]. The disease is characterized by fever, chills, myalgia, headache, nausea, and vomiting [4]. In *P. falciparum* infection, several haematological changes such as anaemia, thrombocytopenia and leukocytosis have been reported [5]. Because of the problem facing the production of vaccine against plasmodium species, the adopted strategy of malaria control is based on chemotherapy and breaking of chain of transmission of the parasites between humans and mosquitoes [6]. Since 2008, Nigeria has changed its treatment guidelines for management of malaria and now use Artemisinin-based combination therapy (ACT) in treating uncomplicated malaria and Quinine for management of acute or complicated malaria [7]. As a result of resistance of malaria parasite to malaria drugs many people in malaria endemic region including Nigerian has resorted into traditional medicine. *T. avicennioides* has been reported as one of the plants that are rich sources of phytochemical such as saponins, steriods alkaloids [8]. The effects of *Terminalia avicennioides* for the treatment of, antihelmintic, cough, body pain and asthma has been reported [1].

Conclusion:

The study concluded that the antiplasmodial activity of total saponin of *T. avicennioides* and its effects on haematology and liver dysfunction are dose related. It is therefore recommended that low dosage of saponin from *T. avicennioides* should be used for the treatment of malaria

Statistical Analysis:

The difference among the group was analyzed using the one-way ANOVA test and the significant test was done using SPSS 17.0 software for this analysis. The results were expressed as Mean \pm Standard mean error (SEM), where the ANOVA level of significance was considered at $P < 0.05$.

Biochemical assay:

Liver homogenates obtained from mice were used to assay for the liver function using spectrophotometric method with

Randox test kits. Para-Nitrophenyl Phosphate (PNPP) was used to determine the ALP activity as described by Cathala and Brunel [16]. ALT and AST levels were measured by the pyruvate and oxaloacetate methods respectively as described by Christen and Metzler [17].

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