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### Anti-Malarial Activity Of Khaya Senegalensis

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#### ABSTRACT

Malaria is one of the most common major health problems all over the world. Pharmacotherapy is the most common treatment strategy for the disease. Khaya senegalensis (Mahogany) belongs to the (family: Meliaceae). K. senegalensis was used in ethnomedicine for the treatment of various disease conditions such as rheumatoid arthritis, diarrhea cough, emetic, emmenagogue and in jaundice. This study was carried out to evaluate anti-malarial activity (Plasmodium falciparum) of K. senegalensis extract of methanol. The extracts of K. senegalensis were screened for its anti-malarial activities (Plasmodium falciparum) with different concentrations (500, 250 and 125 ppm) and Artemether (the reference control) in vitro. The methanol of K. senegalensis which exhibited varied from (81%) mortality with in 72h, at concentration 500 ppm; this was compared with Artemether which gave 85% inhibition at the same time. In conclusion: These studies conducted for K. senegalensis (bark) was proved to have potent anti-malarial activities against Plasmodium falciparum in vitro.

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## INTRODUCTION

Malaria is one of the most widespread infectious diseases, taking the lives of almost one million people a year, most of them in sub-Saharan Africa. Children under the age of 5 and pregnant women are among the most vulnerable (WHO, 2010). Malaria is the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS. According to the World Malaria Report 2011 (WHO, 2011), the demand for medicinal plants is increasing in Africa as the population grows and pressure on medicinal plant resources will become greater than ever. Interest in plant derived medicines has also increased in the West, among the pharmaceutical companies (Pia, 2007).

Medicinal plants have been playing a vital role in the treatment of malaria for thousands of years (Van et al 2000; Rukunga and Simons 2006). Moreover, many drugs, e.g. quinine and artemisinin were isolated from plants and hence wise because of the increased resistance of many pathogens, e.g. malaria parasites, towards established drugs, investigation of the chemical compounds within traditional plants is necessary (Rukunga and Simons 2006). *Plasmodium falciparum* is responsible for more than 95% of malaria cases in Sudan.

Medicinal plants are still invaluable source of safe, less toxic, lower price, available and reliable natural resources of drugs all over the world. People in Sudan and in other developing countries have relied on traditional herbal preparations to treat themselves. Therefore, it is useful to investigate the potential of local plants against these disabling diseases (Amaral et al., 2006 & Koko et al., 2008).

*Khaya senegalensis* belongs to the (family Meliaceae), and is commonly called African Mahogany and it is endemic in many African countries. *K. senegalensis* is a deciduous evergreen tree, 15-30 m high, up to 1 m in diameter, with a clean bole to 8-16 m. The plant is used in ethno medicine for the treatment of various disease conditions such as rheumatoid arthritis, diarrhea and cough (Dalziel, 1948; Brian and Stanfield, 1966; Egwim et al., 2002). It has also been used as an anthelmintic, emetic, emmenagogue and in jaundice treatment (Gill, 1992). The effect of the extract on the rat kidney has also been reported (Joseph et al., 2003). The aqueous extract of stem bark has been reported to reduce anemia (Sanni et al., 2005), and inflammation (Lompo et al., 1998). Some limonoids have been isolated from the stems, barks, leaves and flowers of *K. senegalensis* (Nakatani et al., 2001; Adesida et al., 1971).

With the purpose of searching for new anti-malarial agents, in the present work *K. senegalensis* which are used traditionally for treatment of clinical signs associated with malaria were selected to evaluate the activity of methanol of crude extracts against *Plasmodium falciparum* in vitro.

## MATERIALS AND METHODS

### Plant materials:

The *K. senegalensis* was collected from central Sudan between January 2014 and February 2014. The plant was identified and authenticated by the taxonomists of Medicinal and Aromatic Plants and Traditional Medicine Research Institute (MAPTMRI), Khartoum, Sudan.

### Preparation of crude extracts:

Extraction was carried out for the bark of *K. senegalensis* plant by using overnight maceration techniques according to the method described in Harbone (Harborne, 1984). About 50 g round material was macerated in 250 ml of ethanol for 3 h at room temperature. Occasional shaking for 24 h at room temperature was performed and, the supernatant was decanted. Thereafter, the supernatant was filtered under reduced pressure by rotary evaporator at 55°C. Each residue was weighed and the yield percentage was calculated and then stored at 4°C in tightly sealed glass vial ready for use. The remaining extracts which was not soluble were successively extracted using ethanol with the described technique. The extracts were kept in deep freezer for 48 h, (Virtis, USA) until they were completely dried. The residue was weighed and the yield percentage was calculated. The extracts were kept /stored were required at 4°C until the time of they were required.

**Table 1: Preliminary quantitative data on the amount of *K. senegalensis* used in the anti -malarial activity study:**

Scientific Name of Plants	Family name	Part Used	Yield %	Traditional medicine
<i>K. senegalensis</i>	Meliaceae	Bark	7.5	treatment of various disease conditions such as rheumatoid arthritis, diarrhea, cough anthelmintic, emetic, emmenagogue and in jaundice treatment

This table indicates the scientific names, families, parts used, yield% of ethanol extract and traditional uses of *M. ciliatum*. Parasite culture and in vitro assessment of anti-malarial activity *Plasmodium falciparum* parasite strain was cultured using candle jar method by Trager and Jensen, (1975). For the in vitro anti-malarial assessment of the plant extracts. Selected for this study and the level of parasitemia in the cultures was maintained between 3 to 5 %. Initial screening of anti-malarial activities of different solvent of extracts of the *M. ciliatum* was performed in 96-well microtiter plates using SYBR Green-I based assay (Bennett et al, 2004), all assays were performed using 5 % parasitemia and 7 % hematocrit. Each extract was initially screened for anti-malarial activity against K1 strain of *P. falciparum* at the concentration of 50 µg/ml. The potential candidates which resulted in parasite survival of less than 50 % were further assessed for their IC50. The concentration range of the plant extracts used was 100µl/ml. Artemisinine (51.20nM/L) were used as standard anti-malarial drugs.(14.5 µg/ml )

Statistical analysis:

All data were presented as means  $\pm$  S.D. Statistical analysis for all the assays results were done using Microsoft Excel program (2007).

## RESULTS AND DISCUSSION

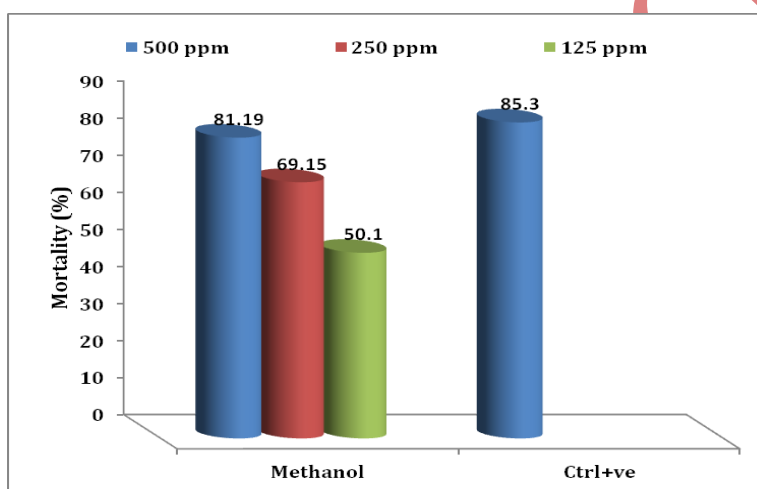
The *K. senegalensis* (family: Meliaceae) was screened for antimalarial activity against (*P. falciparum*) in vitro with different concentrations (500, 250 and 125  $\mu$ g/ml) and Artemisinin (the reference control) with concentration (51.20nM/L).

The anti-malarial potential of the different solvent of extract of *K. senegalensis* were extracted using different concentrations (500, 250 and 125  $\mu$ g/ml) and Artemisinin (the reference control) with concentration (51.20nM/L) to be investigated against *P. falciparum* in vitro. The activity of *K. senegalensis* by used methanol inhibition 81% in the higher concentration (500  $\mu$ g/ml).

**Table 2: Anti-malarial activity of methanolic of *K. senegalensis* (bark):**

S. NO	Solvent of extracts	Concentration ( $\mu$ g/ml)			IC50 ( $\mu$ g/ml)
		Mortality (%) $\pm$ SD			
		500	250	125	
1	Methanol	81.19 $\pm$ 1.11	69.15 $\pm$ 1.52	50.1 $\pm$ 0.29	119.6
2	*Control	85.30 $\pm$ 2.01			

Key: \*Control (Artemisinin) used Concentration (51.20nM/L).



## CONCLUSION

This study verify the use of the barks extracts of *K. senegalensis* in traditional medicine and among different populations worldwide. Furthermore, authors suggestions for this study is to make combinations, further fractionations and compound explorations from these extracts so as to have significant anti-malarial activity.

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