Parasitol Res (2010) 106:1217–1223
DOI 10.1007/s00436-010-1797-y

ORIGINAL PAPER

Laboratory evaluation of traditionally used plant-based insect repellent against the malaria vector *Anopheles arabiensis* Patton (Diptera: Culicidae)

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Received: 22 January 2010 / Accepted: 5 February 2010 / Published online: 2 March 2010

Abstract A laboratory study was carried out to evaluate the repellent efficacy of a methanol-leaf extract of Ethiopian traditionally used insect repellent plant viz., Lomi sar [vernacular name (local native language, Amharic); *Cymbopogon citratus* (DC) Stapf. (Poaceae)] against *Anopheles arabiensis* at four different concentrations viz., 1.0, 1.5, 2.0, and 2.5 mg/cm^2. The percentage protection in relation to the dose method was performed. *C. citratus* extract has shown various degrees of repellency impact against *A. arabiensis*. It provided the maximum total percentage protection of 78.83% at 2.5 mg/cm^2 and followed 68.06% at 2.0 mg/cm^2 for 12 h. All four tested concentrations of *C. citratus* extract offered significant protection and Student's *t* test results shows statistically significant (p value=0.001) [1.0 mg/cm^2 (t=22.89; df=4); 1.5 mg/cm^2 (t=24.03; df=4); 2.0 mg/cm^2 (t=36.92; df=4); 2.5 mg/cm^2 (t=22.31; df=4)] difference between treated and control groups. The result suggests that it could serve as a potent insect repellent against vectors of disease. Globally, *C. citratus* is renowned for its therapeutic values. Above and beyond, due to its user- as well as environmental-friendly nature, it should be promoted among the marginalized populations in order to reduce man-vector contact. In addition, this appropriate strategy affords the opportunity to minimize chemical repellent usage and the risks associated with adverse side effects. At the end of the day, traditionally used plant-based insect repellents could be viable safer alternative sources for chemical insect repellents.

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Introduction

Mosquito-transmitted disease continues to be a major source of illness and death. Most parasitic diseases are tropical, and intensifying globalization and climatic change are increasing the risk of contracting arthropod-borne illnesses (Brower and Chalk 2003; Guenier et al. 2004). Malaria remains a major cause of morbidity and mortality in tropical and subtropical regions of the world, despite decades of malaria control efforts. There are approximately 300–500 million clinical cases and about one million deaths due to malaria globally, and Africa south of the Sahara accounts for over 90% of the disease burden (Snow et al. 2005).

Despite significant efforts to control malaria in Ethiopia since the 1950s, the disease remains one of the top public health problems in the country. An estimated 68% (50 million people) of the population lives in areas at risk of malaria. Malaria was reported as the primary cause of health problems in 2004–2005 accounting for 17% of out-patient visits, 15% of hospital admissions and 29% of in-patient deaths (CSA 2005). Malaria is a leading cause of morbidity and mortality in Ethiopia. Besides, it's a one of