Letter to Editor/Carta ao Editor

Comparison among homemade repellents made with cloves, picaridin, andiroba, and soybean oil against *Aedes aegypti* bites

Avaliação da repelência de preparado caseiro com cravo-da-índia, picaridina, andiroba e óleo de soja contra picadas de *Aedes aegypti*

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Dear Editor:

The dengue epidemic outbreak has progressed in Brazil, and in 2010, infection rates significantly increased compared with 2009[1]. Specific measures to contain disease progression involve vector control and strategies using repellents. The most effective topical repellents against *Aedes aegypti* bites are DEET (N,N-Diethyl-meta-toluamide), picaridin, and permethrin. Permethrin is used in clothing[2,3]. Natural repellents presented poorer performance than industrial ones, despite a potentially better safety profile, cost, and tolerance[4-6]. Recently, information has been released to the media on the efficiency of a home-based repellent composed of cloves (*Syzygium aromaticum*), alcohol, and almond oil[7]. As it has not been adequately studied in controlled studies with repellent indicated by medical literature[8,9], an experiment was performed comparing a popular clove formula, picaridin 20% (positive control), soy oil, Andiroba oil, and when no product is applied (negative control). The study was approved by the Ethics Committee of Botucatu School of Medicine, São Paulo State University — UNESP (CEP 135/08). Four healthy volunteers submitted their forearms to a previously cleaned plastic nursery with 20 healthy *Aedes aegypti* females (Rockefeller strain, from the Laboratory of Parasitology, Biosciences Institute Botucatu-UNESP) subjected to a 24h feeding regime with only 5% glucose solution. Their forearms remained in the container for 5min, and if there were no bites, the volunteers waited for 25min outside the mosquito nursery until the next intrusion. The experiment was discontinued if there were no bites after 120min. Each trial represented a randomized comparison of unprotected forearms with left and right forearms protected by a product using the same group of mosquitoes. Fifty evaluations were performed using different combinations of products and volunteers. Time rankings of the different repellents were compared using a generalized linear model. No adverse effects were observed concerning the applications. Mean times until bites for the different products were: bare arm —13.7s; prepared clove — 104.7s; Andiroba oil — 213.7s; soybean oil — 77.7s; and picaridin — 5488.1s (**Figure 1**). There were no differences between arm repellency times without substances and natural products ($p<0.01$); however, all the natural products showed repellencies that were significantly below picaridin's ($p<0.01$); **Figure 1**.

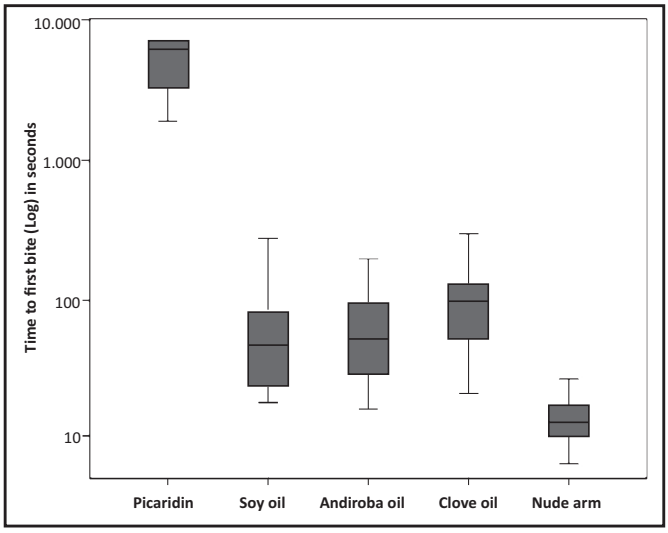

FIGURE 1 - Time (in seconds) for *Aedes aegypti* to bite forearms according to the different substances tested.

Botanical extracts with strong essential oil odor, such as eugenol (from cloves), are popularly referred to as repellents for arthropods[10]. In comparative studies, the essential oils did not have equivalent performances to topical DEET or picaridin repellents, whose use is dissuaded in areas susceptible to disease transmission or for people hypersensitive to insect bites[11]. There is a risk of allergic skin reactions from prolonged use[12].

Different substances and combinations show specific profiles for repelling different arthropods, preventing general conclusions. Field experiments to demonstrate repellent properties have ethical and logistical barriers, encouraging comparative approaches in the laboratory.

The *Aedes aegypti* mosquito is one of the most resistant to repellents. Given the severity and progression of dengue in Brazil, recommending repellent strategies should be based on the best available evidence. Recommending repellents with lower efficacy profiles than those already available can lead to risky behavior by falsely perceived safety. It is the duty of the scientific community to investigate and alert the society to the risks of using ineffective repellents.

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