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Dengue prevention at the household level: preliminary evaluation of a mesh cover for flowerpot saucers

ABSTRACT

The effectiveness of a polyester mesh cover (evidengue[®]), aimed at preventing the access of female *Aedes aegypti* mosquitoes to flowerpot saucers, was evaluated in laboratory. Two saucers of flowerpot with water were individually wrapped with the cover and placed with their respective pots in two entomological cages. One identical set of flowerpot and saucer was placed in a third cage. In each cage, 20 gravid females, fed on mouse blood, were released. Results show that the cover was effective to prevent access of females. Further tests are necessary to assess cover effectiveness as a device to prevent saucer oviposition.

DESCRIPTORS: *Aedes aegypti*. Oviposition. Mesh covers. Flowerpot saucers. Evidengue[®].

INTRODUCTION

Studies performed in dengue-endemic countries show that mosquito-proof mesh covers can block the access of female *Aedes aegypti*, the main dengue vector, to the interior of household water containers and, in this way, prevent oviposition and larval development in them.^{3,4,6,7} The use of unsealed flowerpot saucers makes these containers potential breeding sites for *Ae. aegypti*. However, no studies have been performed to evaluate the effectiveness of mesh covers in these containers.^{1,2,5}

The present communication describes a preliminary laboratory evaluation of a prototype polyester mesh cover for flowerpot saucers (evidengue[®]), now being developed at the *Laboratório de Educação em Saúde, Centro de Pesquisa René Rachou, Fundação Oswaldo, Fiocruz Minas* (Laboratory of Health Education, René Rachou Research Center, Oswaldo Cruz Foundation, Fiocruz Minas).

METHODS

Evidengue^{®a} is a round mosquito mesh cover, manufactured with a polyester synthetic resin mesh equal to or smaller than 2 mm x 1 mm. The prototype evaluated (Figure) has a frill along its opening rim, where a strap of the same material and a rubber band are embedded. The strap and the band allow the fitting of evidengue[®] to the flowerpot. When properly adjusted, evidengue[®] prevents female *Ae. aegypti* access to the saucer completely.

Two black plastic flowerpot saucers with 11 cm in diameter, each containing 220 ml of unchlorinated water, were individually wrapped with evidengue[®] (maximum opening of 18 cm in diameter) and placed with their respective

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^a Schall VT, inventor: Fapemig/Fiocruz/MG Patente MU8303239-8. 28/11/2003.

flowerpots in two entomological cages (A and B) of 40 cm x 40 cm x 40 cm in size, one in each cage. One identical flowerpot and saucer set, with the same amount of unchlorinated water, was placed without evidengue® in a third cage (C) of the same dimensions. A total of 20 gravid female *Ae. aegypti*, bred in laboratory, were placed into each cage to evaluate the mesh cover effectiveness as an access blocking and, consequently, saucer oviposition prevention device. Females were put into the cages, four days after receiving a blood meal from an anesthetized mouse. The procedure was initially performed only in cage A and, ten days after data collection, simultaneously in cages B and C. This interval between procedures was adopted due to female feeding to perform the replica. Cage A was opened on the fifth day, following placement of females; cages B and C, on the eighth day. After cages were opened, it was observed whether there were females inside the evidengue®, as well as larvae in the water and eggs on the flowerpot and saucer surfaces adjacent to the water. Eggs were not counted.

RESULTS

Females, eggs or larvae were not found inside the evidengue®. Persistent movements towards the evidengue® were observed during mosquito flight. In cages A and B, females were seen on the lateral surfaces and on the bottom more frequently. No eggs were found on the surfaces of evidengue®. In cage C, there were eggs on the part of the flowerpot surface adjacent to the water line and four first-stage larvae actively swimming in the saucer.

DISCUSSION

Evidengue® was found to be 100% effective to block access of female *Ae. aegypti* to the flowerpot saucers. This result, however, is limited to a replica of cage A and one control cage only. Further laboratory evaluations are necessary, with a greater number of saucers in both conditions and egg count in each replica. Nevertheless, the mere test of evidengue® in laboratory is insufficient to assess the cover effectiveness as an oviposition prevention device for flowerpot saucers. Evaluations in open air and inside homes are also necessary to verify how proficiently the user blocks mosquito access to standing water in the saucer. In addition, a durability

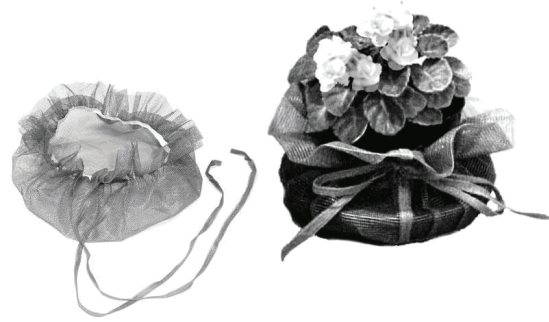


Figure. Left: prototype mesh cover (evidengue®). Right: flowerpot saucer wrapped with evidengue®.

assessment of evidengue® under different conditions of use is necessary.

One critical aspect to be assessed is the maintenance of the evidengue® adjustable ribbon and rubber band to a height of the flowerpot which is far enough from the saucer to prevent that possible mesh lowering (resulting from manual pressure or rain, for example) enables mosquito oviposition in puddles formed by water coming out through the mesh. The *Ministério da Saúde* (Brazilian Ministry of Health) recommends the addition of sand to avoid oviposition inside the saucer. However, unless there is frequent renewal, such measure does not prevent water to gather above the sand level. Only by completely blocking mosquito access to the water will oviposition and larval development in containers be prevented.

Results from a nationwide *Aedes aegypti* infestation index rapid survey^a show that flowerpot saucers have become one of the most frequent *Ae. aegypti* breeding sites of homes in the Center-West and Southeastern regions of Brazil. Apparently, indoor plant gardening in pots has become a habit resistant to change in many cities of the country. Considering the insufficient chemical vector control inside homes and the low population adherence to official recommendations to control domestic water container use, it is reasonable to assume that evidengue® effectiveness as an *Ae. aegypti* oviposition prevention device in flowerpot saucers can be an alternative that, rather than changing this habit, will contribute to maintain it safely.

^a Ministério da Saúde. Portal SUS. Saúde divulga novo mapa da dengue no Brasil. [cited 2009 Aug 19] Available from: http://www.sus20anos.saude.gov.br/sus20anos/portal/index.php?option=com_content&view=article&catid=1%3AAnacionais&id=625%3Asaude-divulga-novo-mapa-da-dengue-no-brasil-&Itemid=34

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