

Ovitrap Surveillance of Aedes Mosquitoes (*Aedes aegypti*) in a University Campus in Chennai, Tamilnadu

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Abstract

Dengue, a major public health problem in India is an arbo-viral disease caused by the dengue virus and female *Aedes* mosquito, mainly *Ae. aegypti* and *Ae. albopictus* play a role in the transmission of disease. Dengue has been rampant in parts of Tamil Nadu in the past two decades. The prevalence of dengue vector and silent circulation of dengue viruses have been detected in rural and urban Tamil Nadu, which is ever increasing [5]. *Ae. aegypti* is an urban mosquito that breed almost entirely in man-made containers (cistern, flower pots, tanks, tyres and cans) found in and around households, construction sites, factories etc. Ovitrap surveillance is the most common sampling method to monitor *Ae. aegypti* and *Ae. albopictus* populations through their egg laying activities. **Methods:** The present study was carried out in 10 different locations in University campus in Chennai, Tamilnadu from 22nd September – 28th September 2013, for a period of one week. We designed two types of Ovitrap A) Ovitrap covered in a cake box with an opening for a mosquito to enter and lay the eggs. B) Ovitrap covered in a cake box without opening. We place A type Ovitrap in 5 locations and B type Ovitrap in rest 5 locations to determine the efficacy of the Ovitrap design to trap the eggs. **Results:** We found 10 eggs from paddle one, 5 eggs from paddle two, no eggs from paddle three, 15 eggs from paddle four and 20 eggs from paddle five. All the eggs from Type A Ovitrap were incubated in the room temperature at the laboratory to identify the species of aedes. All were found to be *Aedes aegypti*. No eggs were found from any of the paddles from Type B Ovitrap. **Conclusion:** Ovitrap will continue to be an integral part of monitoring the density of *A. aegypti* populations and the effectiveness of vector control interventions. We recommend that Ovitrap is a simple, inexpensive and sensitive tool for both monitoring oviposition and collecting large quantities of *A. aegypti* eggs.

Introduction:

Dengue, a major public health problem in India is an arbo-viral disease caused by the dengue virus (DENV) (Family: *Flaviviridae*) comprising four serotypes (DEN-1, DEN-2, DEN-3 and DEN-4) and female *Aedes* mosquito, mainly *Ae. aegypti* and *Ae. albopictus* play a role in the transmission of disease. Dengue Virus Infection (DVI) cause a spectrum of disease ranging from mild infection (dengue fever, DF) to a severe deadly disease - dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS) [1]. About 40% of the global population is living in the areas where transmission of dengue occurs. In an estimate, 50 million dengue infections, including 5,00,000 cases of DHF require hospitalization every year [2]. Earlier, estimated 3.46-3.61 billion people live in areas at risk of dengue from 124 countries which correspond to 53.0-55.0% of the world population [3].

Due to global warming *Ae. aegypti* and *Ae. albopictus* moved northward and had more rapid metamorphosis, the WHO expects millions more to be affected in the coming years [4]. Dengue has been rampant in parts of Tamil Nadu in the past two decades. The prevalence of dengue vector and silent circulation of dengue viruses have been detected in rural and urban Tamil Nadu, which is ever increasing [5]. *Ae. aegypti* is an urban mosquito that breed almost entirely in man-made containers (cistern, flower pots, tanks, tyres and cans) found in and around households, construction sites, factories etc. Ovitrap surveillance is the most common sampling method to monitor *Ae. aegypti* and *Ae. albopictus* populations through their egg laying activities [6]. It has been claimed to be a more effective and sensitive technique as compared to the conventional larval surveys, especially when the *Aedes* infestation rates were very low [7]. Keeping in view that for the last 3-4 years, on one hand there is an increase in Dengue cases in Chennai (Tamilnadu) while on the other hand, lack of information in bionomics of *Aedes* sp. involved in Dengue transmission, it was decided to determine the efficacy of Ovitrap in monitoring the distribution and abundance of *Aedes* species inside the University Campus.

Materials and Methods:

Ovitrap are small container able to hold water. The water serves as a breeding spot for water-breeding mosquitoes. Some Ovitrap use additional chemicals to attract more mosquitoes to lay their eggs. Chemicals are used sometimes to kill the developing larvae before they emerge as adult mosquitoes. Ovitrap make mosquitoes lay their eggs into a controlled breeding spot. Thermo cool cups were used to make Ovitrap, The inside of the cup was lined with a layer of an inexpensive, locally purchased, black-colored, polythene bag covering from the rim of the cup to about 3/4 of the way down and held in place with a Cello tape. We used the ice-cream stick as a paddle which is a piece of balsa wood or a tongue depressor. The present study was carried out in 10 different locations in University campus in Chennai, Tamilnadu from 22nd September – 28th September 2013, for a period of one week. 10 different locations were identified and these 10 Ovitrap were placed with other breeding sources like plastic cups, cans, tyres etc. The wooden paddle was labeled on its posterior with the location number of the Ovitrap using a permanent marker. The Ovitrap were filled with 3/4 of the way with water. We placed the Ovitrap in cake box and sealed it to prevent the entry of other organism. We designed two types of Ovitrap A) Ovitrap covered in a cake box with an opening for a mosquito to enter and lay the eggs. B) Ovitrap covered in a cake box without opening. We place A type Ovitrap in 5 locations and B type Ovitrap in rest 5 locations to determine the efficacy of the Ovitrap design to trap the eggs. Both the types of Ovitrap were placed for a week. After a week, the Ovitrap were collected and analyzed for *A. aegypti* eggs. In collecting the Ovitrap, the fabric pieces were carefully removed from the cup, folded inward to protect any eggs found on the surface from rubbing off, and placed in a plastic bag. The wooden paddles from the Ovitrap were removed from the cups and stored in individual plastic bags. The water was then discarded and the cups stored for future use. Eggs were collected from the paddle and incubated in a room temperature at the laboratory to identify the species.

Results & Discussion:

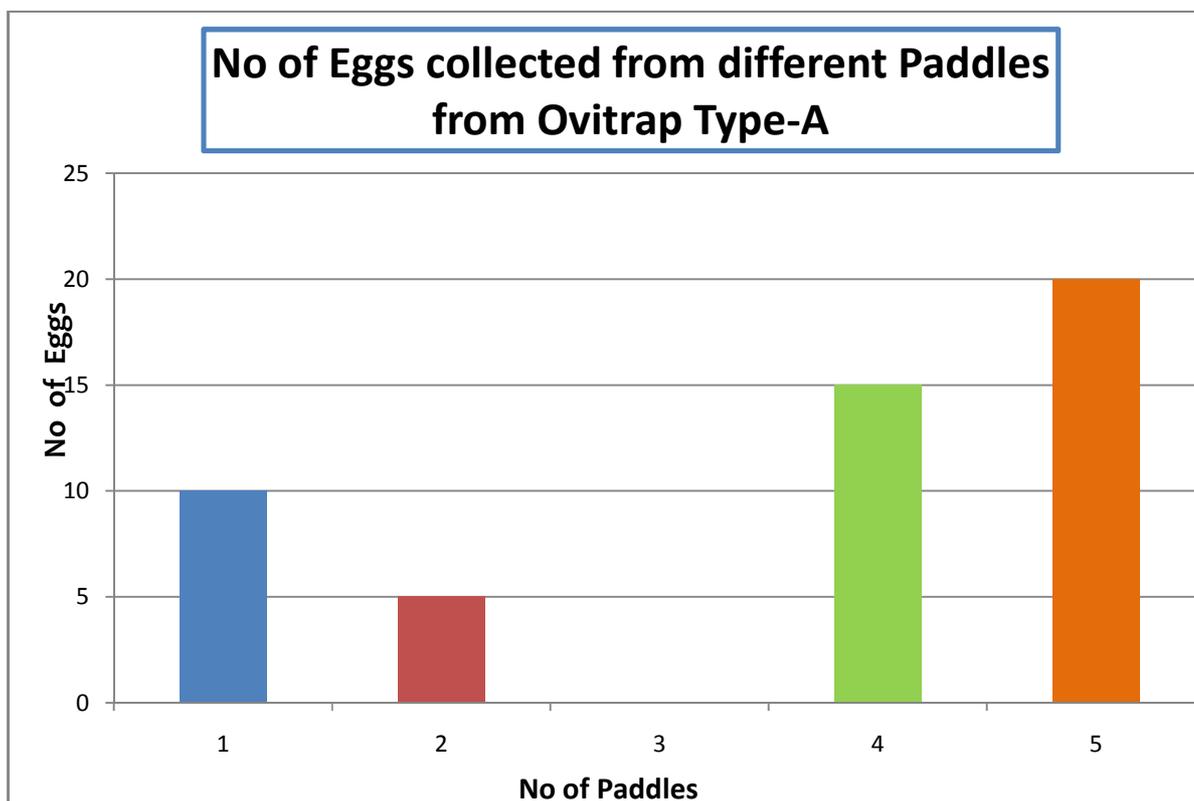
During the study period, 10 Ovitrap (A Type 5 & B Type 5) were installed for each week in different locations.

Type A Ovitrap:

Table: 1 Ovipaddle Egg Collection Count from Type-A Ovitrap

Paddle Number	No of eggs	Species of Aedes
1	10	<i>Aedes aegypti</i>
2	05	<i>Aedes aegypti</i>
3	-	-
4	15	<i>Aedes aegypti</i>
5	20	<i>Aedes aegypti</i>

Figure: 1



We found 10 eggs from paddle one, 5 eggs from paddle two, no eggs from paddle three, 15 eggs from paddle four and 20 eggs from paddle five. All the eggs were incubated in the room temperature at the laboratory to identify the species of aedes. All were found to be *Aedes aegypti*. No eggs were found from any of the paddles from Type B Ovitrap.

So it is clearly proved that the Type A Ovitrap (Ovitrap covered in a cake box with an opening for a mosquito to enter and lay the eggs) has a better efficacy to attract the mosquitoes to breed and lay eggs than Type B Ovitrap (Ovitrap covered in a cake box without opening). Owing to inherent human behavior and some traditional habits, detection of the presence of different mosquito vectors in urban situations has been a difficult task. It has been observed that the vector species are common in most areas on account of deficient water management, presence of non-degradable and long lasting water holding containers and materials, as well as increasing urban agglomerations and inability or lack of mobilization to the population to the need to eliminate mosquito breeding sites. In a study conducted on dengue vector surveillance at Malaysia, the mosquito abundance was found related to population and human activity [8]. Positive Ovitrap is an indication of human activity that provides a suitable environment for the propagation of these vector species in the residential area. Earlier, it was stated that *Ae. aegypti* is strictly domiciliary, preferring less vegetation, biting indoors and primarily found indoors [9, 10].

Dengue is a disease associated with the slum areas, where breeding of *Aedes* mosquitoes is most prevalent [11]. However, the Ovitrap surveillance in the selected areas showed that *Aedes* mosquitoes are not only associated with the slum areas, but they are also associated with the University campus. As per the gathered observations, the settlement site had numerous natural and artificial containers providing good larval habitats. But the campus sites had a clean environment, with minimal natural containers. As all the houses, hostels inside the campus had piped water supply, thus there was no necessity for the residents to store water. From our observations, the residential and campus sites had minimal natural containers. The only possible habitat for *Aedes* mosquitoes was the concrete drainage system outside the hostels. The drains had clear stagnant water with fallen leaves and other debris. *Aedes* larvae require clear, but not necessarily clean water and this was provided by the clear stagnant clear water of the drain [12, 13]. In this way the drains served as good artificial larval containers for *Ae. aegypti*. Although the egg yield of ovitraps using wooden paddles has been previously demonstrated to be high [14]. Our study showed Type A Ovitrap (Ovitrap covered in a cake box with an opening for a mosquito to enter and lay the eggs) has a better efficacy to attract the mosquitoes to breed and lay eggs than Type B Ovitrap (Ovitrap covered in a cake box without opening). Other Ovitrap designs have used seed germination paper to line cups much in the same way we used black-colored, polythene bag [15].

Conclusion:

As dengue continues to re-emerge worldwide, efforts to prevent and contain epidemic outbreaks will continue to rely on vector control. Ovitrap will continue to be an integral part of monitoring the density of *A. aegypti* populations and the effectiveness of vector control interventions. We recommend that Ovitrap is a simple, inexpensive and sensitive tool for both monitoring oviposition and collecting large quantities of *A. aegypti* eggs.

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