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CONTROL OF DENGUE VECTOR *AEDES AEGYPTI* USING HOUSEHOLD DISINFECTANTS

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ABSTRACT

The mosquito *Aedes aegypti* is responsible for transmitting dengue virus. These mosquitoes are associated with the living spaces of humans. They generally spend their entire lives in and around the houses where their eggs hatched. Accessing indoor larval habitats of *Ae. Aegypti* to apply larvicides is a major limitation in many urban contexts. Keeping this in mind the present study was aims to evaluate the potential of different household disinfectants to check *Aedes* mosquito larvae in domestic environment. Susceptibility of early fourth instar larvae of *Aedes aegypti* was evaluated to each of five selected household disinfectants (Mopz ™, Lizol, Dettol, Savlon, Sterillium® hand Sanitizer) using WHO standard protocol.Out of five disinfectants only mopz™ and Lizol demonstrated promising larvicidal activity with 100% mortality below 0.04 % concentration followed by Dettol the same activity at 0.08% concentration. Savlon and hand sanitizer Sterillium®, were not found effective against larvae. The promising larvicidal activity obtained with Mopz ™, Lizol and Dettol, which are easily available in market and very convenient to use makes them important measures for *Aedes* control. Further research is needed to develop a handy household larvicidal agent for safe domestic use.

KEY WORDS: *Aedes aegypti*, Dengue, Disinfectant, Larvae, Larvicide.

INTRODUCTION

Mosquitoes are important pests that affect human health and well-being throughout the world.[1] The problems of mosquito transmitted diseases are quite severe worldwide resulted

in high morbidity and mortality.[2] Mosquitoes in the larval stage are attractive targets for pesticides because they breed in water and, thus, are easy to deal with them in this habitat.[3]

The preference of *Aedes aegypti* residing in and around human habitation and breed in very small collection of water makes its control difficult. Most of the insecticides used in potable water for larval control are not accessible to common man. They are not available in the market in small packs. People generally don't know where to get these insecticides how to use them at what concentration and frequency of use. Big containers can be covered and protected from mosquito breeding. *Aedes* prefer to lay eggs in small collection of water mostly in money plant grown in bottles, flower vase and other collections of water in plats under the vase which can't be covered. To overcome this problem present investigation was designed to use household disinfectants as larvicidal agents. Disinfectants, antiseptics and preservatives are chemicals which have the ability to destroy or inhibit the growth of microorganisms and are parts of infection control practices.[4]

Disinfectants may include alcohols, quaternary ammonium Compounds, hypo-chlorides, iodine, bromines, pine oils, peroxide or phenolic compounds.[5] The scope of the organisms controlled and the mechanism of performances varies widely. The present experiment was planned to evaluate the potentials of different house hold disinfectants under different trade names against *Aedes aegypti* mosquito larvae.

MATERIALS AND METHODS

Collection of samples

Samples of five commonly used disinfectants (Mopz ™ (Disinfectant surface cleaner), Lizol (Disinfectant floor cleaner) Dettol (Antiseptic liquid), Savlon (Antiseptic Liq.), Sterillium® (Liq.hand sanitizer) were procured from supermarket/chemist shop for larvicidal testing.

***Aedes aegypti* larvae:** Larvae of *Aedes* mosquitoes used in this assay were maintained in the insectary of Haffkine Institute. Cyclic generation of adult mosquitoes were kept in small cages at room temperature 27-30^{0C} and 75-80 R.H., fed with 10% glucose solution and animal blood meal given to the female mosquito for egg laying. Wet filter papers were provided as substrate for egg deposition. The eggs were transferred in enamel trays half-filled with water. The hatching larvae were fed with pedigree dog biscuits and yeast at 3:1 ratio. Late 3rd or early 4th instar larvae were used for the experiment (Figure-1).

Larval susceptibility bioassay

Bioassay for larvicidal activity was carried out using WHO procedure with slight modifications[6]. Late 3rd or early 4th instar larvae of laboratory strain of *Aedes aegypti* in three replicates (25 larvae/beaker) were introduced into different beakers containing graded concentration; 0.1 to 0.01% in 250 mL de-chlorinated water. Standard larvicide Abate was used as positive control. Beakers were covered with muslin cloth to avoid the entry of any foreign material. No food was offered to the larvae during exposure period of 24 hrs. Larval mortality was recorded by counting dead and moribund larvae after 24 hrs. Dead larvae were those, which could not be induced to move when they were probed with needle in the siphon or cervical region. Moribund larvae were those incapable of rising to the surface or not showing the characteristic diving reaction when water is disturbed. Corrected mortality was calculated by Abbots formula.[7]

RESULTS AND DISCUSSION

The results of larvicidal activity are presented in table-1. Disinfectants, Mopz ™, and Lizol demonstrated promising results with 100% larval mortality below 0.04 % concentration, followed by Dettol the same activity at 0.08%. Savlon antiseptic and hand disinfectant Sterillium® did not show anti-larval. Positive control Abate showed 100% mortality. No mortality was observed in water control. All the data showed that the mortality progressively increased with increasing concentrations and there was a significant difference between treatment and control.

The rapid human population growth and increased urbanisation has led to substandard housing, inadequate water supply and waste management systems and consequently an abundance of mosquito breeding sites.[8] Storage of drinking water and other urban water, containers including plant-pot bases, guttering, tarpaulins, tyres and discarded containers can all collect rainwater and provide habitat for *Aedes aegypti* larvae [9,10]

Difficulty of accessing indoor larval habitats of *Ae. Aegypti (*e.g. water-storage containers, plant vases, saucers) to apply larvicides is a major limitation in many urban contexts.[11,12] The selection of disinfectants were made on the basis of their antibacterial activity and easy availability for domestic use. Outbreak of dengue makes government agencies to enforce in-house survey and survey of residential colony.[13] Searching each and every house is not practically possible and faces lots of practical problems. Many people are not ready to take out the plants even in epidemic situation, because, they keep plants as purifier and to remove

Vastu defects in their homes. In such situation the promising larvicidal activity of disinfectants makes them very important measures for *Aedes* control. Further studies are recommended to determine various combination ratios with the aim to identify synergy in their actions.

Table I: Larvicidal activity of household disinfectants against *Aedes aegypti* mosquito larvae

S. No.	disinfectants	% mortality 0f larvae after 24 h*					
		% Concentration					
		0.1	0.08	0.06	0.04	0.02	0.01
1.	Mopz ™	100	100	100	100	55.64±2.61	8.17±0.92
2.	Lizol	100	100	100	100	31.37±1.92	2.03±1.05
3	Dettol	100	99.01±0.65	31.94±8.16	07.38±3.12	00.00	00.00
4.	Savlon	2.91±1.19	-	-	-	-	-
5.	Sterillium®	1.08±0.73	-	-	-	-	-
6.	Water control	0.00					
7.	Abate (0.05ppm)	100					

*Values are mean ±SD of three replicates of two experiments

Figure1: Picture showing early fourth instar larvae of *Aedes aegypti*

CONCLUSION

The results are particularly interesting because household disinfectants are ready to use larvicide in domestic environment. Further research needs to be focused to improve efficacy with other agents in combination for maximum impact at minimal concentration purely for mosquito control.

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