Short Report

Abundance and dengue virus dynamics of *Aedes aegypti* and *Aedes albopictus* in selected urban areas of Kegalle and Peradeniya

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Dengue, caused by the dengue virus (DENV) is the most important vector borne infection in the tropics and can present as dengue fever(DF) or dengue haemorrhagic fever(DHF).[1] DENV exists as four different serotypes, all of which have been circulating in Sri Lanka for the past 30 years. [2] DENVs are transmitted by the mosquito species *Aedes aegyptii* and *Aedes albopictus*, both of which are endemic to the South Asian region of the world. In Sri Lanka, the primary vector in transmitting DENV is *A. aegyptii* while *A. albopictus* serves as the secondary vector.[3]

Though DF and DHF have been around for at least the last thirty years in Sri Lanka, it was not until 2000 that dengue was identified as a major public health problem in the island. This was mainly due to the increase of DHF cases leading to dengue shock syndrome (DSS) and death.[4] Molecular epidemiological studies carried out on DENV serotypes before and after the emergence of DHF indicate that changes in the molecular pattern and evolution of DENV are likely to have contributed to the clear cut differences in clinical severity of DF and DHF in Sri Lanka.[2,8]

A number of studies have been carried out worldwide to identify the dynamics of DENV within the vector to determine how they contribute to the changes in the dynamics of DF/DHF in the relevant region. However, such studies have been lacking in Sri Lanka. The first step in such a direction would be to identify the prevalence and DENV carriage of *Aedes* species of mosquitoes in endemic regions. Hence, the aim of this study was to identify the abundance of *Aedes* mosquitoes in two regional areas of Sri Lanka and to identify the presence, if any, of DENV in them, using a commercially available NS1 immunochromatography assay (SD Diagnostics) which was evaluated in a previous study for the detection of DENV NS1 in mosquitoes.[1]

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Mosquitoes (n=165) were collected from the areas of Kegalle and Peradeniya within the period of July and September 2011 during which many DF/ DHF cases had been reported in these towns (Table 1). Individual collection sites were not GIS mapped or identified through any other

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mapping modes to determine whether these mosquitoes were collected near or around the households of dengue confirmed or suspected patients.

Table 1. Number of *Aedes m*osquitoes collected from two regional areas

Area	*Aedes aegypti*	*Aedes albopictus*	Total
Peradeniya	10	35	45
Kegalle	40	80	120
Total	**50**	**115**	**165**

The mosquitoes were collected using an oral aspirator or entomological net from both indoor and outdoor sites of these areas and refrigerated. A dissecting microscope was used to identify different species of adult *Aedes* mosquitoes. Mosquitoes (males and females) from the same region and the same species were pooled together . Ten pools of 10 to 20 of *A. aegypti* and *A. albopictus* were prepared (Table 2). Each pool was homogenized in 1000 µl of PBS under sterile conditions at 4 ^{o}C. 100 µl of each pool homogenate was added to the NS1 antigen strip and observed after 15 to 20 minutes for bands developing from antigen and antibody reaction.

Our study indicated an abundance of *A. albopictus* mosquitoes in comparison to *A. aegypti* mosquitoes in both study regions as shown in Table 2. This finding supports previous studies carried out in Sri Lanka where *A. albopictus* has been discovered in abundance in comparison to *A. aegypti*.[5,6]

Table 2. *Aedes* mosquito pools with mosquito numbers, type and area

Pool No.	*Aedes* species	No of mosquitoes	Area of collection
1	*A.albopictus*	10	Peradeniya
2	*A.albopictus*	10	Peradeniya
3	*A.aegypti*	10	Peradeniya
4	*A.aegypti*	20	Kegalle
5	*A.aegypti*	20	Kegalle
6	*A.albopictus*	15	Peradeniya
7	*A.albopictus*	20	Kegalle
8	*A.albopictus*	20	Kegalle
9	*A.albopictus*	20	Kegalle
10	*A.albopictus*	20	Kegalle

One previous study also showed *A. albopictus* as the major DENV carrier during the time of the study, emphasizing the role played by *A. albopictus* in DENV transmission in places where *A. aegypti* is in low prevalence.[5]

None of the pools tested in the current study gave a positive result in the DENV NS1 antigen assay, which is considered specific and sensitive in detecting the NS1 antigen in experimentally infected mosquitoes.[1] However, this may not be the case for the detection of NS1 in wild type infected mosquitoes. The sensitivity of the assay in detecting DENV in wild type mosquitoes might be affected by a number of factors, including the virus-mosquito interaction, mosquito-DF/DHF patient interaction and DENV load in the mosquitoes. It is possible that none of the mosquitoes tested were infected with DENV or the DENV load in them was lower than the detectable level

in the test assay. Given that the mosquitoes were collected from areas where DF and DHF were prevalent during the period of collection, the chances of the mosquitoes not coming into contact with DF/DHF patients are unlikely. The absence of NS1 in the tested pools therefore may be more likely to be due to low viral load.

Vector studies carried out in selected areas in the Kandy district of Sri Lanka show *A. albopictus* to be more efficient at DENV transmission.[7] Due to the negative results in our study, we were unable to estimate DNA carriage and transmission in each of the *Aedes* species in question. An estimation of DENV carriage would aid in vector surveillance, risk assessment and dynamics of DENV infection in the areas of study.

In conclusion, *Aedes albopictus* was the predominant species of *Aedes* mosquitoes found in the selected urban and suburban areas of Kegalle and Peradeniya. DENV NS1 antigen detection using immunochromatography assay was negative in both *A. aegypti* and *A. albopictus* pools. However, this finding does not necessarily mean that DENV is absent in *A.aegypti* and *A. albopictus* mosquitoes in the Kegalle and Peradeniya areas. More sensitive methods of detection such as RT-PCR on the pooled test samples may provide more information on DENV carriage. Testing a large number of *Aedes* mosquitoes and mosquito surveillance within and outside households of dengue confirmed patients should also be considered in the future for DENV detection in *Aedes* mosquitoes.

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