Abstract

## Background

Susceptibility of *Ae. aegypti* mosquito to dengue virus (DENV) varies geographically and can be influenced by climatic factors such as temperature, which affect the incidence, seasonality and distribution of vector-borne diseases. The first outbreak of dengue fever (DF) in Kenya occured in 1982 in the coastal towns of Malindi and Kilifi. Unlike Nairobi where no active dengue transmission has been reported, DF is currently re-emerging at the Coast causing major outbreaks. This study investigated the vector competence of *Ae. aegypti* populations from two urban areas, Kilifi (Coast of Kenya) and Nairobi (Central Kenya), for DEN-2 virus and the influence of temperature on the same.

## Methods

Four-day old adult female *Ae. aegypti* mosquitoes collected as eggs from the two sites were exposed to defibrinated sheep blood mixed with DEN-2 virus ($10^{5.08}$ PFU/ml) using a membrane feeder. Half of the exposed mosquitoes were incubated at high temperature (30°C) and the other half at low temperature (26°C), and every 7 days up to day 21 post-infection 30% of the exposed mosquitoes were randomly picked, individually dissected, separated into abdomen and legs, and tested for midgut and disseminated infection, respectively, including virus quantification by plaque assay using Vero cells.

## Results

Nairobi mosquito populations exhibited significantly higher midgut infection rates (16.8%) compared to the Kilifi population (9%; $p = 0.0001$). Midgut infection rates among the populations varied with temperature levels with a significantly higher infection rate observed for Nairobi at high (21.3%) compared to low temperature (12.0%; $p = 0.0037$). Similarly, for the Kilifi population, a significantly higher infection rate was recorded at high (11.6%) relative to low temperature (6.8%; $p = 0.0162$). It is however, noteworthy that disseminated infection was higher among the Kilifi mosquito population (40.7%) than in Nairobi mosquitoes (10.3%; $p < 0.0001$).

## Conclusion

The findings show a clear inherent difference between the two populations in their ability to develop disseminated infection with high temperature having an added effect of enhancing vector competence. Therefore, the inherent difference among the two populations of *Ae. aegypti* coupled with prevailing ambient temperature could partly explain the distribution of dengue 2 virus between the Coastal and Nairobi regions in Kenya.