**PUBLIC RELEASE: 2-MAR-2016**

Chikungunya could be misdiagnosed as dengue -- masking spread of the disease

BIOMED CENTRAL

Chikungunya, a viral disease transmitted by infected mosquitoes, could have been misdiagnosed as dengue because both have similar symptoms, according to a study published in the open access journal *BMC Infectious Diseases*. This could potentially result in inaccurate understanding of the prevalence of chikungunya, as well as chikungunya-dengue co-infection, with potential consequences for diagnosis, treatment and disease control.

To address this problem and to investigate the current understanding of chikungunya-dengue co-distribution, the study, led by researchers from the London School of Hygiene & Tropical Medicine, created global maps that represent the geographical spread of both viruses, identifying their current geographical limits, as well as countries at risk of future infection.

Chikungunya has very similar symptoms to the acute phase of dengue, which is a widespread viral infection in tropical and sub-tropical regions, and this often makes the diseases indistinguishable. These symptoms include fever, rash, muscle and joint pain. As there is no specific antiviral drug treatment or vaccine, treatment is directed primarily at alleviating symptoms. Misdiagnosis could have an effect on how the symptoms of each disease are relieved - potentially with serious consequences.

The study is the first systematic review of dengue-chikungunya co-infection, which means that all of the available evidence from the peer-reviewed literature was gathered together. Clinical outcomes and main vectors - the species of mosquito most involved in transmission - have so far been poorly described and the article identifies several limitations in the current understanding of distribution and consequences of co-infection. It includes an up-to-date database of the global distribution of both diseases, as well as their main vectors.

Laith Yakob, Lecturer in Disease Vector Biology and lead author of the study, said: "The symptoms of dengue and chikungunya infections are similar and diagnoses are typically only symptom-based. During dengue outbreaks, or in countries that historically suffer dengue epidemics, clinicians tend not to confirm their diagnosis in the laboratory; dengue infection is assumed. Co-infection is typically only detected during recognized chikungunya outbreaks and this reflects a widespread bias in how these diseases are reported."

More than half of the world's population inhabits areas at risk of dengue infection. The researchers identified a total of 154 countries that reported dengue and 99 countries that reported chikungunya. Out of 98 countries which reported both diseases, 13 recorded co-infections. The research article includes a map (Fig. 1, link below) showing the global distribution of both viruses, reports of co-infection, as well as the principal vectors.

The researchers noted a rapid expansion in the global extent of chikungunya, misdiagnosis of which has so far obscured its true public health impact. Misdiagnosis can affect the outcome for infected patients as it risks delaying or disrupting disease-specific treatment.

Chikungunya-dengue co-infection persists in Africa and South-East Asia and has been shown to spread through international travel and transport of goods, for example by introducing chikungunya to regions in which it had not previously been reported but where dengue was present.

The researchers also investigated the distribution of disease vectors. The mosquito Aedes aegypti spreads both dengue and chikungunya and it is endemic to 174 countries. The species is highly anthropophilic - it prefers human blood to animal blood. Aedes albopictus, which also spreads both viruses, is adaptable to less extreme climates than Aedes aegypti. It has previously been shown to be susceptible to co-infection. The new study highlights the fact that Aedes albopictus is endemic to 88 countries, while 68 countries reported the presence of both species.

Laith Yakob said: "The vector species that spread these pathogens - and also the Zika virus - are the same, yet the number of countries that have reported dengue cases is considerably higher than countries that have reported chikungunya. Our study highlights that this may be an aberration caused by continuing and pervasive misdiagnosis of chikungunya as dengue."

The researchers say that due to the similarity of symptoms between dengue and chikungunya, improved and inexpensive diagnostic tests are desperately needed. Additionally, clear protocols are needed for realistic and effective control procedures. For example, following a chikungunya outbreak in French territory Le Reunion, an island southwest of Mauritius in the Indian Ocean, in 2006, countries including France, Italy and Switzerland adopted a linked surveillance system for both viruses and their vectors. In addition to a global database of chikungunya case notifications, making the disease nationally notifiable would require outbreaks to be reported to authorities in countries at risk of transmission, as is already the case for dengue but not chikungunya in some countries, like Australia. As has previously been undertaken for dengue, developing early warning systems for chikungunya and dengue-chikungunya co-infection could further understanding of both diseases.

Further study is needed to determine if infection with one virus makes a host more or less susceptible to infection with the other, or if co-infection exacerbates disease symptoms, which could not be confirmed in this study. The researchers also suggest future investigation of how infection with one virus affects vector competence - a vector's ability to acquire, maintain and transmit a virus. Infection with one virus may reduce or enhance a vector's competence for other viruses or even different strains of the same virus, which may enhance or reduce the potential for transmission.