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Department of Medical Microbiology and Parasitology, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia

Abstract

The emerging threat of Zika virus outbreak with associated neurological abnormalities needs to be assessed in perspective in terms of its ability to cause a pandemic. This article attempts to throw some light on the issue.

Keywords: Zika virus, Aedes, arboviruses, countermeasures, pandemic

The current outbreak of Zika virus (ZIKV) infections in Latin America is a global public health emergency (1) which may signal an emerging pandemic. Prior large outbreaks had occurred in Yap, Micronesia in 2007 (2) and in the French Polynesia, South Pacific in 2013-2014 (3). Serological evidences indicated that ZIKV circulates in human populations in Africa, Southeast Asia, and the Indian Ocean (4,5).

ZIKV shares a similar urban vector, *Aedes (Ae.) aegypti* with other related flaviviruses like dengue (DENV) and yellow fever; and also chikungunya virus (CHIKV). *Ae. albopictus* as a new vector for ZIKV was reported in a 2007 outbreak in Gabon (6). The mosquito is more widely distributed with increasing geographic range (7-9), and increased transmission efficiency (10) that had caused global geographic expansion of CHIKV and DENV (11). ZIKV could mutate to adapt to *Ae. albopictus* (6) when it spreads to new areas where the mosquito is present. The eventual establishment of a sustainable transmission cycle could presage further expansion of the ZIKV (6), even to temperate regions (8,12-14). Non-vector borne transmission of ZIKV (15,16) including sexual transmission (17,18), adds to its pandemic potential.

Increased in microcephaly cases during an outbreak of a newly circulating ZIKV is highly suggestive of a causal relationship; especially with presence of incriminating circumstantial evidences (19,20). However, case-control studies are needed to confirm the association and identifying other possible risk factors (19), including presence of a virulent ZIKV strain since genomic changes in the virus have been reported (21). Case detection would be difficult due to frequent asymptomatic presentations (2); while

symptoms are non-specific and similar with other more commonly diagnosed DENV and CHIKV infections (22,23) - thus confounds clinical diagnoses, while specific aetiological diagnoses require high-quality reference laboratories to resolve the cross-reactivity between flavivirus serology results (4,20). Moreover, initial prenatal ultrasounds could be normal, with late confirmed cases (24). Microcephaly could also be occurring in later trimesters (Dr Lacerda Nogueira, Faculdade de Medicina de Sao Jose do Rio Preto - FAMERP, Brazil, ProMED-mail post; archive number: 20160111.3925377), which implies that the risk could be throughout the pregnancy period.

Co-circulation of DENV during ZIKV outbreaks in the French Polynesia (25) and Brazil (26) could have contributed to pathogenesis of Guillian-Barre syndrome (27) and possibly microcephaly (20). CHIKV has also established in areas where ZIKV is reported (6,25,26) and thus is a high likelihood for its co-circulation too. How these arboviruses interplay in a shared ecology still remain uncertain (22).

Border quarantine, by screening of travellers at airports and the border, to prevent importation of infectious diseases is hampered by low detection rate (28,29); more so with ZIKV infections which are mostly asymptomatic. Vaccine development on an accelerated emergency basis could use the existing flavivirus vaccine platforms. However, pre-emptive vaccination would not be cost-effective as arboviral epidemics are unpredictable and sporadic, and sudden explosive outbreaks makes rapid deployment of vaccine stockpiles logistically impossible (30). Moreover, non-availability of incentives for vaccine production makes dependence on large pharmaceutical companies problematic (31). Thus, vector control

remains the only choice for current deployment; but might be difficult for *Ae. albopictus* as it often breeds in less accessible areas and produces cold-resistant eggs (12). Moreover, the uncontrollable spread of DENV had exposed weaknesses in vector control due to expense, logistics, public resistance, and problems posed by inner-city crowding and poor sanitation (30).

In conclusion, the potential for rapid spread of ZIKV with severe diseases could not be overlooked. The virus certainly has the prerequisites for the emergence and global spread.

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Conflict of Interest

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Correspondence

Associate Professor Dr Fauziah Mohamad Idris
MD (USM), MPath (UM)
Department of Medical Microbiology and Parasitology
School of Medical Sciences
Universiti Sains Malaysia
16150 Kubang Kerian
Kelantan, Malaysia
Tel: +609-767 6287
Fax: +609-767 6289
Email: fauziahmi@usm.my

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