DENGUE, ZIKA AND CHIKUNGUNYA - CHALLENGES FOR VECTOR CONTROL GIVEN THE OCCURRENCE OF THREE ARBOVIRUSES - PART I

Editorial

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Long before the emergence of the Chikungunya virus (CHIKV) and the Zika virus (ZIKV) in the Americas and in Brazil between 2013 and 2015, with a record of major epidemics[1-3], there was already a consensus that the traditional model of vector control alone was not capable of stopping the geographical spread of dengue throughout areas hitherto unaffected[4,5].

On the other hand, the academic community concluded that a global initiative for immunization, with a large-scale development of vaccines against dengue, will not considerably reduce the transmission of the virus (DENV) if not coupled with other interventions[6].

The combination of a more efficient vector control – which has an impact on the force of disease transmission – with the vaccination of large populations – to decrease the proportion of susceptible individuals – appears to be a promising strategy[6,7]. However, realistically, the lack of an effective cost-effective vaccine against all four serotypes of DENV and the unavailability of treatment and specific immunobiological drugs against CHIKV and ZIKV still highlight the battle against *Aedes aegypti* as a central strategy for the containment of arboviruses. However, vector control will only succeed if it includes new technologies and tools that can – in conjunction with those already in effect – achieve more satisfactory results proven to reduce the burden of disease and not only improve entomological indicators[7].

Arboviruses: magnitude of the problem

Dengue is a viral disease transmitted by arthropods (arbovirus) responsible for the largest number of cases and deaths worldwide, representing a serious public health problem on a global scale[7]. The exponential increase in the incidence of the disease and its geographic expansion are impressive given that by the end of 1960 only nine countries had reported outbreaks with autochthonous transmission. In 2016, dengue has become endemic in more than 120 countries, with 100 million estimated cases every year and four billion people living in areas considered at risk for infection by DENV[4,6,8]. Brazil accounts for about 70% of all cases reported in the Americas each year. In 2010, twenty-five years after the re-emergence of the disease in the country, more than one million cases were reported by Brazilian states, which overwhelmed health services with nearly a hundred thousand hospitalizations and 678 deaths – half of which were of people under 42 years[9].

The potential association between ZIKV and the occurrence of microcephaly and other congenital abnormalities in fetuses and babies whose infection was vertically transmitted in the Americas led the World Health Organization to declare that it is a Public Health Emergency of International Concern (PHEIC) in February 2016[10,11]. The association, which would be recognized as causal relationship by the US Centers for Disease Control and Prevention (CDC) and the WHO two months later, was suggested by Brazilian neurologists from September 2015 based on the increase in cases of microcephaly in areas with previous epidemic history of

ZIKV[10-13]. In August 2016, the Ministry of Health reported 1,806 confirmed cases of microcephaly and/or CNS changes suggestive of congenital infection accumulated since they started to be counted in November 2015[14].

The ZIKV was first isolated in Brazil in blood samples obtained in March 2015 in Bahia[15], but reports of an unknown rash disease date back to the end of 2014 and it is likely that its introduction in Brazil has actually occurred in 2013[12,16]. Since then, Brazil started to identify in some states the simultaneous circulation of three arboviruses as autochthonous transmission of Chikungunya virus (CHIKV) was already reported since September 2014[2]. Throughout 2015 and 2016, explosive outbreaks of Chikungunya fever occurred in several states of Northeastern Brazil. Last year alone, there were more than 170,000 probable cases in Brazil[17].

The reasons for the rapid spread of arboviruses are complex and not well understood. However, it can be said that in addition to intrinsic factors related to pathogenic agents themselves, climatic, demographic and social changes have contributed to this process. Particularly, the increased movement of people across countries (migration or leisure) appears to have been instrumental in introducing both CHIKV and ZIKV in the Americas[2,16]. The rapid and unplanned urbanization in most developing countries, for example, is related to the increase in infections by DENV as it expands the habitat of primary vectors, particularly *Aedes aegypti*, in densely populated areas[18,19]. The circulation of viruses emerging in areas where the mosquito is endemic, the poor sanitation and a totally susceptible population allows to exacerbate this association.

This issue is currently giving rise to new studies and research given its impact on global health and it is not totally covered in this Editorial, which allows the debate to continue, which will be held in the next issue of the Brazilian Journal in Health Promotion.

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