

## Neonatal Chikungunya: Spotlight on Gaps in Public Health

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**W**hen Chikungunya virus caused outbreaks in India in the mid-1960s, it was transmitted exclusively by *Aedes aegypti* mosquitos [1]. At that time, *Aedes aegypti* was confined to urban habitats in many, but not all, states. Therefore, outbreaks in the 1960s were somewhat limited geographically. Moreover, the disease was relatively inconsequential – without chronicity, sequelae or fatality [1].

Chikungunya reappeared in India as an epidemic in 2006 and spread pan-India [1]. The Ministry of Health and Family Welfare of India assumed the new epidemic also to be inconsequential based on the earlier experience, but did not investigate the epidemiology and clinical consequences [2]. However, this time, the virus was more virulent and pathogenic; it caused severe disease that was complicated by chronicity and sequelae [1]. Moreover, it caused deaths in adults [3]. A group of investigators reported on its epidemiology and fatality in Ahmedabad [3]. This very important cue was apparently not followed by systematic studies by Public Health in India [2]. This time, both *Aedes aegypti* and *Aedes albopictus* were efficient for virus transmission [4].

India's Public Health missed the opportunity to notice and investigate the occurrence of vertical transmission of Chikungunya from mothers to their newborns in India; although, such possibility was known [2]. Recently a number of reports have appeared on neonates with Chikungunya [5,6]. The current issue of *Indian Pediatrics* carries a report on a series of 13 neonates with Chikungunya and brain involvement, citing more reports on neonatal Chikungunya in India [7]. All reports on neonatal Chikungunya have come from institutions with adequate diagnostic facilities [5-7]. As Chikungunya is now endemic all over India, it would be a safe assumption that cases are occurring in innumerable communities, both urban and rural, but are not investigated; hence not specifically diagnosed, and not reported even if diagnosed. The published reports are just the tip of the iceberg.

As India aims to reduce our birth rate to replacement level, we have the moral duty to ensure survival with health and wellbeing of every newborn. Neonatal infections are already many, varied and complex; to this matrix is neonatal Chikungunya now being added [7]. Fever, hyperpigmentation and encephalopathy should alert the healthcare staff to the possibility of Chikungunya [7]. Maternal history of febrile illness during pregnancy must be elicited for circumstantial evidence and laboratory diagnostic support must be sought for specific diagnosis [7]. In order to ensure such quality health services in India, nothing short of universal primary and secondary healthcare will suffice. We have a long way to travel before equitable and quality assured care is provided in all communities – urban and rural. Protecting people's health is a primary duty of all democracies.

When new infectious diseases emerge in India, as in other countries with established health management using modern scientific medicine, they must be addressed two ways. One approach is to address the new disease as a clinical problem, understand its clinical manifestations and clinical and laboratory diagnostic details and treatment modalities. In this manner, clinicians are enabled to practice evidence-based medicine. Indian Academy of Pediatrics (IAP) is playing its role exemplarily through publications on neonatal Chikungunya in its mouthpiece, *Indian Pediatrics*.

While members of IAP are thus educated, other healthcare workers involved in treatment of neonates and children do not seem to have access to a formal channel of continuing education. Since Chikungunya virus infection and disease are widely prevalent throughout India, the enormity of this gap can easily be imagined. This gap needs to be recognized and rectified by the Government.

The second need is for a Public Health approach for prevention and control of the emerging disease – specifically here, neonatal Chikungunya, or its broadened base of Chikungunya during pregnancy. For this purpose, the Government's maternal and child health program,

currently under the National Health Mission, ought to develop evidence-based guidelines to help prevent infection during pregnancy. While endemic Chikungunya in the community is not being effectively prevented, we have a special duty to protect pregnant women so that both the mothers and their babies are protected from the disease that so often adversely affects the neuro-developmental growth of children [7]. Healthcare personnel should also be educated in recognizing neonatal Chikungunya – both for diagnosis by laboratory tests and for management in competent facilities.

Neonatal Chikungunya is to be taken very seriously not only in its own right, but also as a warning signal of the future possibility of emergence of the highly pathogenic Zika virus in India. Interestingly both Chikungunya virus and Zika virus have phenotypes with low virulence and high virulence. Both these viruses are transmitted by *Aedes aegypti* mosquitos. The message is clear: India faces a huge risk of the entry and spread of the virulent Zika virus, which is at present prevalent in countries half the world across, in South America.

It is widely known that *Aedes aegypti* invaded South America during the second half of the twentieth century. Potential exists for the virulent Zika virus to be imported into India either by infected mosquitos or by infected individuals. Public Health in India, under the Union Government's Ministry of Health and Family Welfare, has the onerous task to closely monitor any and all events related to Zika virus entry and emergence in India. While Chikungunya is a somewhat milder brain-affecting disease in the fetus and neonate, the consequences of maternal Zika virus infection on the brain development of the fetus will be very serious and it should be averted by all available means. Forewarned is forearmed!

Comprehensive and integrated *Aedes* control is the urgent need of the present time. Viruses transmitted by *Aedes* mosquitos include dengue, Chikungunya, Zika and yellow fever. *Aedes* control is notoriously difficult; all the more reason that we should be investing heavily on mosquito control. *Aedes* control has to be systematically applied in all human habitats for which monitoring of mosquito bionomics must be established in every district. Public Health must not shy away from this responsibility, moral and managerial. All species of mosquitos have to be addressed through source reduction, for which many methods are available. Locality-specific mosquito control must be applied with continuous monitoring. Such a broad-based vector control approach will bring in large dividends by way of the prevention and control of all mosquito-transmitted infectious diseases – malaria, filariasis, Japanese encephalitis, dengue, West Nile,

Chikungunya and Zika.

For *Aedes aegypti* control, there is a new promising approach. There is a natural symbiotic bacterium of insects, mosquitos included, namely *Wolbachia* species. Apparently due to the fact that *Aedes aegypti* breeds in small collections of clean water, *Wolbachia* does not infect them in nature. However, once deliberately infected with *Wolbachia* species, the vectorial capacity, *i.e.*, the ability to transmit viruses by *Aedes* mosquitos, is drastically reduced (Jambulingam A, Personal communication). Much work needs to be done to adapt this approach into the Indian milieu. The Indian Council of Medical Research (ICMR) is already working to develop and translate this idea for its attractiveness as an additional intervention.

Congenital and perinatally acquired Chikungunya infection is in itself an important problem to be addressed seriously by Public Health. Without broad-based control of Chikungunya virus transmission in the population, targeted protection of pregnant women is incomplete as a solution. Targeting only Chikungunya is incomplete without targeting all viruses transmitted by *Aedes*. Public Health in India, managed by the Union Ministry of Health and Family Welfare, has the responsibility and opportunity to control all mosquito-transmitted infectious diseases and also document the success in evidence-based and convincing manner, justifying the investment. We must not procrastinate or prevaricate – the matter is extremely urgent and long overdue.

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