ScienceDirect

Transactions of the Royal Society of Tropical Medicine and Hygiene

Volume 106, Issue 5, May 2012, Pages 273-282

Review

Fifty years of dengue in India

Anita Chakravarti [a], Rohit Arora [b], Christine Luxemburger [c]

Show more

https://doi.org/10.1016/j.trstmh.2011.12.007

Get rights and content

Summary

Dengue is the most important mosquito-borne, human viral disease in many tropical and sub-tropical areas. In India the disease has been essentially described in the form of case series. We reviewed the epidemiology of dengue in India to improve understanding of its evolution in the last 50 years and support the development of effective local prevention and control measures. Early outbreak reports showed a classic epidemic pattern of transmission with sporadic outbreaks, with low to moderate numbers of cases, usually localized to urban centres and neighbouring regions, but occasionally spreading and causing larger epidemics. Trends in recent decades include: larger and more frequent outbreaks; geographic expansion of endemic transmission; spread of the disease from urban to peri-urban and rural areas; an increasing proportion of severe cases and deaths; and progression to hyperendemicity, particularly in large urban areas. The global picture of dengue in India is currently that of a largely endemic country. Understanding demographic differences in infection rates and severity of dengue has important implications for the planning and implementation of effective public health prevention and control measures and targeting of future vaccination campaigns.

Introduction

Dengue emerged in the second half of the twentieth century as a major public health concern in many tropical and sub-tropical regions around the world. It is currently the most important mosquito-borne, human viral disease in terms of both the number of cases and the number of deaths. Dengue is considered a major global threat by the World Health Organization (WHO).[1]

Dengue virus (DENV) infection results in a broad spectrum of clinical presentations, ranging from asymptomatic or a mild, non-specific fever, to classic dengue fever (DF), and severe presentations such as dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS) which is often fatal;2, 3 death usually results from circulatory collapse due to massive plasma leakage.2, 3 There is no specific treatment for DHF or DSS although with proper clinical diagnosis and management fatality rates are less than 1%.[1]

There are four closely related DENV serotypes (DENV-1 to DENV-4). Infection is thought to confer lifelong immunity against variants of the same serotype but only partial and transient (2–3 months) cross-protection against infection by other serotypes, so one can be re-infected sequentially with DENVs of different serotypes.[1] There is evidence that secondary heterotypic DENV infections may carry an increased risk of developing severe forms of the disease.[4]

Until recently, the burden of dengue may not have been as widely recognized in India compared with other Asian countries, in particular Thailand, Vietnam and the Philippines. However, since the mid-1990s, epidemics of dengue in India have become progressively larger and more frequent, usually starting in urban centres and quickly spreading to neighbouring regions. India became endemic for both DF and DHF as transmission became sustained during the inter-epidemic periods in large parts of the country.5, 6 Moreover, recurring dengue epidemics eventually resulted in the establishment of hyperendemic areas, typically large, densely populated cities where several or all four DENV serotypes circulate in a sustained fashion.[6]

The public health importance of dengue in India is now acknowledged, but its epidemiology has been described in the literature primarily in the form of case series reporting on individual outbreaks and there are few comprehensive reviews.6, 7, 8, 9 The purpose of this review is to provide an overview of available data on the epidemiology of dengue in India to improve the understanding of its evolution in recent decades and support the development of effective prevention and control measures.

The disease pattern of dengue in India is described using annual numbers of reported cases and deaths and their geographic distribution, where available, together with data on gender, age distribution, rural spread, and seasonality. Serotype circulation data is summarized by calendar year and state.

Details of the literature search for papers on dengue are shown in Box 1.

Section snippets

Early epidemics of dengue in India

Sporadic outbreaks of DF have been reported in India for over two centuries,2, 7 but the earliest virologically confirmed outbreak occurred in 1956 in Vellore, Tamil Nadu.[8] The first large epidemic of dengue began in 1963 in Calcutta, West Bengal, from where it spread to other states, eventually affecting most of the country.[6] This was the first dengue epidemic in India with significant numbers of DHF cases, with up to 30% of cases showing hemorrhagic manifestations, and resulted in 200 deaths.7…

Conclusions

In recent years the epidemiology of dengue infection in India has evolved rapidly. Regular and gradually larger outbreaks have been observed, accompanied by a tendency for the disease to spread from urban to rural areas resulting in an expansion in geographic range. Outbreaks of dengue have been reported throughout India with the exception of a few areas where conditions do not support the propagation of the vector. Dengue endemicity has been established in large areas throughout India.

Disease…

Authors' contributions

CL oversaw the initial literature search and review; AC and RA identified additional literature and data published in India. All authors contributed to the conception and writing of this manuscript and approved the final version. CL is guarantor of the paper.…

Funding

This work was funded by Sanofi Pasteur.…

Competing interests

RA and CL are employed by Sanofi Pasteur, manufacturer of an investigational dengue vaccine candidate.…

Ethical approval

Not required.…

Acknowledgements

We thank C. Okais at Sanofi Pasteur for her contribution to the literature search. This manuscript was prepared with the assistance of a professional medical writer, E Seleiro.…

References (99)

S.B. Halstead
Dengue
Lancet (2007)

S.K. Kabra *et al.*
Dengue haemorrhagic fever in children in the 1996 Delhi epidemic
Trans R Soc Trop Med Hyg (1999)

J.G. Rigau-Pérez *et al.*
Dengue and dengue haemorrhagic fever
Lancet (1998)

R. Kumaria
Correlation of disease spectrum among four Dengue serotypes: a five years hospital based study from India
Braz J Infect Dis (2010)

K.K. Mukherjee *et al.*
Outbreak of febrile illness due to dengue virus type 3 in Calcutta during 1983
Trans R Soc Trop Med Hyg (1987)

S.K. Acharya *et al.*
Outbreak of Dengue fever in Delhi
Lancet (1988)

A. Pandey *et al.*

The evolution of dengue over a decade in Delhi, India
J Clin Virol (2007)

L. Kabilan *et al.*
Field-and laboratory-based active dengue surveillance in Chennai, Tamil Nadu, India: observations before and during the 2001 dengue epidemic
Am J Inf Control (2004)

A.P. Goncalvez *et al.*
Diversity and evolution of the envelope gene of dengue virus type 1
Virology (2002)

R. Rico-Hesse
Microevolution and virulence of dengue viruses
Adv Virus Res (2003)

View more references

Cited by (135)

Outbreak investigation of Dengue like fever in rural area of Rajasthan
2023, Indian Journal of Medical Microbiology

Show abstract

Performance evaluation of a rapid dengue NS1 antigen lateral flow immunoassay test with reference to dengue NS1 antigen-capture ELISA
2023, Journal of Clinical Virology Plus

Show abstract

The mismatch of narratives and local ecologies in the everyday governance of water access and mosquito control in an urbanizing community
2023, Health and Place

Show abstract

Odonata identification using Customized Convolutional Neural Networks
2022, Expert Systems with Applications

> *Citation Excerpt :*
> ...One another important role of the odonates is to keep the population of mosquitos under control. It is estimated that there are 390 million dengue infections per year (Bhatt et al., 2013) with Asia (70% of total infections) and India contributing 34% (33 million infections) of the global total (Chakravarti, Arora, & Luxemburger, 2012). One of the main reasons for the increasing mosquito-borne diseases is the loss of habitat for odonates (Subramanian, 2009)....

Show abstract

Larvicidal property of the extracts of the seaweeds; Sargassum wightii, S. ilicifolium and Gelidiella acerosa against Anopheles stephensi, Aedes aegypti and Culex quinquefasciatus
2022, Biocatalysis and Agricultural Biotechnology

Show abstract

Global and Local Evolutionary Dynamics of Dengue Virus Serotype 1, 3 and 4
2023, Epidemiology and Infection

View all citing articles on Scopus

Recommended articles (6)

Research article

First record of natural vertical transmission of dengue virus in *Aedes aegypti* from Cuba
Acta Tropica, Volume 174, 2017, pp. 146-148

Show abstract

Research article

Revitalising community engagement and surveillance challenges for strengthening dengue control in Jodhpur, Western Rajasthan, India — A mixed method study
Journal of Infection and Public Health, Volume 13, Issue 11, 2020, pp. 1755-1761

Show abstract

Research article

Dengue and dengue vectors in the WHO European region: past, present, and scenarios for the future
The Lancet Infectious Diseases, Volume 14, Issue 12, 2014, pp. 1271-1280

Show abstract

Research article

Assessing effect of climate on the incidence of dengue in Tamil Nadu
Indian Journal of Medical Microbiology, Volume 31, Issue 3, 2013, pp. 283-286

Show abstract

Research article

Dengue
The Lancet, Volume 385, Issue 9966, 2015, pp. 453-465

Show abstract

Research article

Community knowledge, awareness and preventive practices regarding dengue fever in Puducherry – South India
Public Health, Volume 129, Issue 6, 2015, pp. 790-796

Show abstract

View full text