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Dengue in India: Insights in the Indian Context

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Abstract

The mitigation of infectious diseases in India, notably Dengue, assumes pivotal importance due to their significant repercussions on human and animal health, thereby imposing a considerable burden on the healthcare infrastructure. This review underscores the ongoing initiatives in infectious disease management, endorsing the implementation of a comprehensive healthcare strategy. Emphasis is placed on the augmentation of reporting mechanisms through the integration of IgM detection kits, advocating for heightened investments in research endeavors. The strategic allocation of resources, coupled with precision-targeted interventions, is underscored as essential for effective disease control. Collaborative engagements among governmental entities, healthcare professionals, and community stakeholders are identified as imperative components in reinforcing the healthcare system. This approach is deemed necessary for navigating the intricate and evolving landscape of infectious diseases in India, aligning with the overarching goal of enhancing public health outcomes.

Keywords: Infectious diseases, India, dengue, healthcare system, Aedes mosquitoes

INTRODUCTION

Dealing with infectious diseases in India is crucial because they seriously affect both human and animal health, putting a significant burden on our healthcare system. While we have had success in controlling diseases like malaria, plague, leprosy, and cholera in the past, India's varied geography and population distribution create unique challenges in the spread of viral diseases.

By adopting the International Health Regulations (IHR 2005) [1, 2], India has made significant strides and remains strongly dedicated to establishing and running a disease surveillance program. The Union Ministry of Health and Family Welfare launched the Integrated Disease Surveillance Project (IDSP) in 2004 to link district hospitals and state-run medical institutes

This facilitates tele-education, health professional training, and disease trend monitoring. The project, managed by the Central Surveillance Unit at the National Centre for Disease Control in New Delhi, aims to detect early signs of potential disease outbreaks. It employs information and communication technology at district, state, and national levels to prompt swift and effective health actionsThe IDSP has an "unusual clinical symptoms" category in addition to managing viral infections, colds, respiratory problems and vaccine-preventable diseases.This category helps alert public health professionals to any intentional release of biological agents [3].

New diseases cause serious health damage and economic losses.The heightened monitoring and surveillance efforts by organizations like the U.S. Centers for Disease Control and Prevention (CDC) [4], the World Health Organization (WHO), and various published reports on cases, outbreaks, and epidemics have revealed numerous previously unknown viral pathogens emerging worldwide at a rising rate. Several instances of the emergence or re-emergence of viral infections have been

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documented in India over the past few decades. The discussion below outlines some noteworthy viral infections in India that could potentially pose significant health and economic challenges in the future.

The Nipah virus, a zoonotic paramyxovirus, emerged in Southeast Asia in 1998, causing a major outbreak in Malaysia. In India and Bangladesh, bats pose a continual risk of transmitting the virus to humans, leading to recurring outbreaks [5, 6]. Chikungunya fever, caused by the re-emerging CHIKV arbovirus, is a viral disease. CHIKV, an RNA virus in the Togaviridae family, Alphavirus genus, reappeared in India in 2005–2006 after 32 years, causing over 1.38 million cases across 14 states and Union Territories. It primarily follows a human-mosquito-human transmission cycle in Asia, with its vertebrate reservoir identified in Africa. Similar outbreaks occurred in Indian Ocean islands during the same period [7, 8].

One of the most Common and significant viral infection hampering Indian population is Dengue which is discussed in detail below.

Dengue is a significant health concern in India, transmitted by Aedes mosquitoes. Each year, many people are affected, adding to the strain on healthcare. Dengue outbreaks have been ongoing since the 1950s, and the severity of the disease has increased over the past two decades. In 2013, around 74,454 cases were reported, resulting in 167 deaths, according to data from the National Vector Borne Disease Control Programme (NVBDCP). The increasing number of reported cases may be attributed to the availability of IgM detection kits from the National Institute of Virology and improved reporting. Notably, young adults are the most affected group, and the severity of the disease in India is considered lower than in other South-East Asian countries. Pediatric cases of dengue haemorrhagic fever have a notably high mortality rate. Genetic changes, including genotype alterations and genome mutations, have been identified in the dengue virus. It's important to mention that there's a lack of well-structured epidemiological studies [9].

Several important conclusions can be drawn by analyzing data from the National Institute of Communicable Diseases and the Director General of Health on the website of the Government of India[10].

The data presented from 2018 to 2023 sheds light on varying trends in confirmed cases across different states and union territories in India. Notably, Telangana has witnessed a consistent rise in confirmed cases, reaching a significant number in 2022 at 5138. Uttar Pradesh and Tamil Nadu have also shown steady increases, with 5742 and 4148 confirmed cases in 2022, respectively. Delhi, despite fluctuating numbers, reported a high count of 5221 confirmed cases in 2022. Historically, Maharashtra has been a state with high case numbers, although specific data is not provided in the table. On a positive note, some states have seen a decline in confirmed cases. Uttarakhand stands out with a notable decrease from 2337 cases in 2021 to 1588 cases in 2022. Sikkim has also demonstrated a positive trend, decreasing from 264 to 163 cases from 2021 to 2022. Similarly, D&N Haveli, Chandigarh, and Daman & Diu exhibited decreases, reflecting effective measures in managing the spread of the virus. However, some regions, like West Bengal, have incomplete data for certain years, warranting further analysis when complete information is availableBy 2022, Puducherry will have declined, but there is little historical data to warrant proper analysis.

Examining the presented data and trends reveals the imperative nature of India's ongoing efforts to address infectious diseases, particularly the challenges posed by diseases like Dengue. Despite historical successes in managing diseases such as malaria, plague, leprosy, and cholera, the persistent threat of Dengue necessitates a comprehensive and adaptable healthcare strategy. Notably, the availability of

IgM detection kits has improved reporting and underscores the importance of a proactive approach in both prevention and treatment.

In light of the identified gaps in well-structured epidemiological studies, there exists a critical need for increased investment in robust research initiatives. Such endeavors would not only deepen our understanding of these diseases but also inform evidence-based strategies for prevention and control.

Concerning the state-wise data provided, strategic resource allocation and targeted interventions are vital. States experiencing upward trends, like Telangana, Uttar Pradesh, and Tamil Nadu, require intensified efforts, while the positive trends observed in Uttarakhand, Sikkim, D&N Haveli, Chandigarh, and Daman & Diu can serve as models for effective strategies.

Conclusion - In conclusion, the management of infectious diseases in India is paramount due to their profound impact on human and animal health, imposing a substantial burden on the healthcare system. Although India has made notable progress in controlling diseases like malaria, plague, leprosy, and cholera, the diverse geography and population distribution present unique challenges in combating viral diseases. The International Health Code (IHR 2005) is a testament to India's commitment to establishing a successful disease control systemThe Integrated Disease Surveillance Project (IDSP) has played a crucial role in connecting healthcare facilities, enabling tele-education, professional training, and disease monitoring. This proactive approach, supported by information and communication technology, aims to detect early signs of potential disease outbreaks. The emergence and re-emergence of viral infections, such as the Nipah virus and Chikungunya fever, highlight the continuous threat and underline the importance of vigilant monitoring and surveillance efforts by organizations like the U.S. CDC and the WHO. Dengue, a significant health concern transmitted by Aedes mosquitoes, poses a continuous challenge in India. Despite advancements in detection and reporting, there is a need for more structured epidemiological studies to fully understand and address the complexities of the disease. Analyzing state-wise data on Dengue cases reveals varying trends, necessitating targeted interventions. States experiencing an increase in cases, like Telangana, Uttar Pradesh, and Tamil Nadu, require intensified efforts, while positive trends in Uttarakhand, Sikkim, D&N Haveli, Chandigarh, and Daman & Diu offer models for effective strategies. In moving forward, continued investment in robust research initiatives is crucial to enhance our understanding of infectious diseases, inform evidence-based prevention and control strategies, and address existing gaps in epidemiological studies. The presented data underscores the urgency of a comprehensive and adaptable healthcare strategy to effectively tackle the persistent threat of infectious diseases in India. A comprehensive approach encompassing public awareness, vector control, and healthcare infrastructure enhancement is essential for reducing the burden of infectious diseases. Collaborative efforts between government bodies, healthcare professionals, and the community are crucial in developing a resilient healthcare system capable of adapting to the evolving landscape of infectious diseases in India.

CONCLUSION

In conclusion, the management of infectious diseases in India is of paramount importance, given their profound impact on both human and animal health, imposing a substantial burden on the healthcare system. Despite notable successes in controlling diseases like malaria, plague, leprosy, and cholera, the diverse geography and population distribution in India present unique challenges in combating viral diseases as a model for the Integrated Disease Surveillance Project (IDSP), India has demonstrated its commitment to build an effective disease surveillance system through adoption of the International Health Code (IHR 2005).The ongoing emergence and re-emergence of viral infections underscore the continuous threat, emphasizing the need for vigilant monitoring and surveillance efforts by global organizations.

Dengue, transmitted by Aedes mosquitoes, remains a significant health concern, and despite advancements in detection and reporting, more structured epidemiological studies are needed. State-wise data analysis reveals varying trends, necessitating targeted interventions. Positive trends in some

states offer models for effective strategies. Moving forward, continued investment in robust research initiatives is crucial to enhance our understanding, inform evidence-based strategies, and address gaps in epidemiological studies. The presented data underscores the urgency of a comprehensive and adaptable healthcare strategy to effectively tackle the persistent threat of infectious diseases in India. A collaborative approach involving public awareness, vector control, and healthcare infrastructure enhancement is essential for reducing the burden and developing a resilient healthcare system capable of adapting to the evolving landscape of infectious diseases in India.

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