BRIEF REVIEW
pISSN 0976 3325 | eISSN 2229 6816
Open Access Article
www.njcmindia.org

Japanese Encephalitis (JE): Population at Risk and Strategies to Control in India

Sourabh Saxena[1], Priti Chaudhary[2], Ashish Chauhan[3]

Financial Support: None declared
Conflict of Interest: None declared

How to cite this article:
Saxena S, Chaudhary P, Chauhan A. Japanese Encephalitis (JE): Population at Risk and Strategies to Control in India. Natl J Community Med 2018;9(8):637-640

Author's Affiliation:
[1]State Training Officer, John Snow India; [2]Immunization Consultant, UNICEF Delhi; [3]Technical Officer-Immunization, John Snow India

Correspondence
Dr. Sourabh Saxena
drsaxenaaa@gmail.com

Date of Submission: 05-06-18
Date of Acceptance: 14-08-18
Date of Publication: 31-08-18

ABSTRACT

Currently, an estimated 3 billion people live in the 24 countries, mainly in the WHO South-East Asia and Western Pacific Regions, considered at risk of JE. The case-fatality rate can be as high as 30%, with 20-30% of survivors suffering permanent intellectual, behavioral, or neurological problems. Overall annual incidence in endemic countries has been estimated at 5.4/100000 in the 0–14 year age group, and 0.6/100000 in those aged more than 15years.In lack of convincing data on actual disease burden due to inappropriate diagnostic facilities and strong quality surveillance mechanism for the virus in India, some researchers has shown there concern to continue a national program to control a highly localized illness with around 1000 cases and 200 odd deaths every year.

Immunization as well as other strategies like periodic fogging, promotion of personnel protective measure (protective clothing, use of mats/coils/repellant/aerosol and establishment of paediatric Intensive care unit in endemic districts has been advocated since long. Presently out of total 231 JE endemic districts across 22 states, campaign activity has been completed in 230 districts and JE vaccination has been started as a part of routine immunization. In last few years cases of adult Japanese encephalitis has been reported from identified JE endemic districts.Accordingly, 31 endemic districts were identified across 3 states where adult JE vaccination campaigns were recommended. The adult JE campaign, covering adults aged 15-65 years, have been completed in these 31 districts wherein 33 million adults were vaccinated against JE.

Key words: Japanese Encephalitis, Vaccination, Immunization

BACKGROUND

Japanese encephalitis (JE) is a vector-borne zoonotic viral disease. JE virus (JEV) is amongst the leading cause of viral encephalitis in Asia. JE occurs in nearly all Asian countries, whether temperate, subtropical, or tropical, and has intruded into new areas through importation of infected vectors. Currently, an estimated 3 billion people live in the 24 countries, mainly in the WHO South-East Asia and Western Pacific Regions, considered at risk of JE.Although severe clinical disease is rare (about 1 case per 250 infections), JE disease can be devastating. The case-fatality rate can be as high as 30%, with 20-30% of survivors suffering permanent intellectual, behavioral, or neurological problems. [1,2]

The presence of JE is increasingly being recognized in countries in Southeast Asia and the Western Pacific. JE is spread throughout Asia and some parts of Oceania. Cases have been reported in India, Nepal, Sri Lanka, Bangladesh, Myanmar, Laos, Cambodia, Thailand, Vietnam, Malaysia, China, Philippines, Indonesia, Korea, Japan, Papua New Guinea and, most recently, in the Southern part of Australia. In some countries, the numberz of cases are in-

creasingas reported in Bangladesh, Cambodia, India, Indonesia and Laos, while in some countriescases have decreased or are decreasing, i.e. in Japan, South Korea, China, and Thailand. Countrywide JE endemicity has been reported from countries like Bangladesh, Myanmar, Bhutan, Sri Lanka, Thailand, Cambodia, Papua New Guinea, China, LAO PDR, Philippines and Vietnam. However, some countries show regional JE endemicty - In Nepal 51 mountain and hill districts are endemic for JE, whereas in Bhutan, 21 districts are endemic for JE, in Indonesia Bali, Nusa Tenggara, all provinces on Borneo and Sulawesi, and the Moluccas are endemic for JE, in Papua New Guinea all provinces on the main island are endemic for JE.[3]

While traditionally considered a childhood disease, JE can occur at all ages, particularly when the virus is introduced in new areas where the population has no pre-existing immunity.The annual incidence of JE differs considerably between and within affected countries. In endemic countries, many of which already have JE vaccination programmes, annual incidence also varies by age group. Overall annual incidence in endemic countries has been estimated at 5.4/100000 in the 0–14 year age group, and 0.6/100000 in those aged more than 15years.These values mask significant variations in reported incidence across regions, with incidence in the younger age group estimated as high as 12.6/100 000 in some high-incidence areas (e.g. parts of China, and Democratic People's Republic of Korea).[4,5] As cases in children decrease due to successful vaccination programmes, there is frequently a shift to a greater proportion of cases in older, unvaccinated age groups. Data from some countries suggest that a substantial proportion of adults are still susceptible. In some countries, such as Bangladesh which has no JE vaccination programme, over 50% of cases occur in adults. [1,6]

Transmission of Japanese encephalitis virus: JEV is transmitted primarily by Culex mosquitoes, and circulates in an enzootic cycle in pigs and wading birds which serve as amplifying hosts. Culex tritaeniorhynchus, the most important vector species, breeds in water pools and flooded rice fields and bites mainly during the night. Due to the animal reservoirs, JEV cannot be eliminated but disease could potentially be controlled by universal human vaccination in endemic areas. Humans are considered dead-end hosts, with viraemia too low to allow further transmission. [1]

In temperate locations, the period of transmission of JEV typically starts in April or May, and lasts until September or October. In tropical and subtropical areas, transmission exhibits less seasonal variation, or intensifies with the rainy season. Where irrigation permits mosquito breeding throughout the year, transmission may occur even in the dry season.[7]Risk factors for JE include living in close proximity to rice fields and family or neighbor ownership of pigs.[8]JE is predominantly, although not exclusively, a rural disease. Few cases have been detected in cities, such as New Delhi, in the absence of rural travel, possibly suggesting expansion of the area of JEV transmission due to changing land use patterns or vector adaptation.[9,10]

Strategy for prevention and control of JE: The main components of strategy for prevention and control of Japanese Encephalitis in the country are Vaccination, case management, disease and vector surveillance, laboratory diagnosis through sentinel sites in government/private medical colleges and hospital, capacity building and BCC/IEC.

JE vaccination in India: In view of the repeated epidemics and severe outbreak of Japanese encephalitis in India, the MoHFW, Government of India, decided to implement JE vaccination in the endemic districts in the country in 2006. Due to limited availability of vaccines, decision was made to introduce JE vaccine only in endemic districts. Initially 113 endemic districts were identified across 15 states by National Vector Borne Disease Control Programme (NVBDCP). JE campaigns were then planned in a phased manner among identified 113 districts from 2006 to 2011. India has introduced the live attenuated SA 14-14-2 JE vaccine (Chengdu Institute of Biological Products) in endemic districts in campaign mode in 2006 for children of 1-15 years of age. A single dose of JE vaccine was added subsequently as a part of routine immunization programme in these districts. From April 2013 onwards, a second dose of JE vaccination was added to the routine immunization programme. The first dose is given at 9 mts (along with Measles Containing vaccine (MCV) 1st dose) and the second at 16-24 mts (with 1 DPT booster dose/MCV-2).

Strategy for JE vaccination:

Strategy for JE vaccination is one time campaign with a single dose of live attenuated JE vaccine for children aged 1-15 year age group in endemic districts of the country. Immediately following campaigns, integration of JE vaccine into the Routine immunization in the district - 1st dose in the target group of infants aged 9-12 months and 2nd dose – in infants aged between 16-24 months.

Other strategies like periodic fogging, promotion of personnel protective measure (protective clothing, use of mats/coils/repellant/aerosol and establishment of paediatric Intensive care unit in endemic districts has been advocated since long. [12]

History of JE in India

1952	- First evidence of JE viral activity by NIV during sero-surveys for arbo-viruses.
1955	- Occurrence of several outbreaks reported in Vellore, Tamil Nadu.
1973	- Outbreaks reported in Bankura and Burdwan districts (West Bengal)
1976	- Repeat outbreaks in Bankura and Burdwan districts (West Bengal)
1978	- Widespread occurrence of suspected JE cases - National level monitoring initiated by NMEP in 1978. - Initiation of immunization using inactivated mouse brain vaccine
2005	- Massive JE Outbreak hit Eastern UP and Bihar - Around 6000 AES/ JE cases /1500 deaths were reported from UP - Around 6500 AES/JE cases/1600 deaths from 10 states of India.
2006-2011	- 113 endemic districts of 15 -States planned to be covered in 5 years in a phased manner -First 5 year phase of JE vaccination campaigns conducted in 15 States- 113 districts of Indiawith introduction of 1 dose of JE vaccine in Routine Immunization (at 9-12 months of age)after 6 months of campaign. - 78 million children immunized,
2013	-Second dose of JE vaccination introduced in RI
2014	-Adult JE vaccination started in selected endemic districts

Realizing the gravity of problem of AES & JE in the country, a Group of Ministers (GoM) was constituted by Govt. of India envisaging multi-pronged strategy encompassing prevention (sanitation, safe drinking water, improvement in nutrition etc.), case management (capacity building of medical and para-medical staff, referral etc.) and rehabilitation (physical and social rehabilitation of disabled children) measures to address the problems relating to JE/AES. Along with Ministry Of Health And Family Welfare, other ministries like Ministries/Departments of Drinking Water & Sanitation, Women & Child Development, Social Justice & Empowerment, Housing & Urban Poverty Alleviation, School Education and Health Research are engaged to supervise and monitor the activities of the Programme in coordination with various stakeholders including State Governments.[13]

Presently out of total 231 JE endemic districts across 22 states, campaign activity has been completed in 230 districts and JE vaccination has been started as a part of routine immunization,. Till date 155 million doses have been provided under various JE vaccination campaigns.

Changing epidemiology: In last few years cases of adult Japanese encephalitis has been reported from identified JE endemic districts. Subsequently it was recommended to introduce JE vaccination in adult populations in endemic districts based on available evidence of substantial adult disease burden, with well-defined operational guidelines to ensure effective implementation of the policy. [14] Accordingly, 31 endemic districts were identified across 3 states where adult JE vaccination campaigns were recommended. The adult JE campaign, covering adults aged 15-65 years, have been completed in these 31 districts wherein 33 million adults were vaccinated against JE.

DISCUSSION

Since humans are not the only reservoirs of the JE virus, it is highly unlikely to eliminate JE infection from the community; also JE only represents 14-15% of all AES cases in the country. In lack of convincing data on actual disease burden due to inappropriate diagnostic facilities and strong quality surveillance mechanism for the virus in India, some researchers has shown there concern to continue a national program to control a highly localized illness with around 1000 cases and 200 odd deaths every year.[12, 15]Also the disease almost exclusively affects the rural residents, vaccination of individuals residing in urban areas has been questioned. On the other hand, many experts are concerned at the continued neglect of some more serious, significant public health problems like rabies – a universally prevalent entity killing around 20,000 people every year in the country.[16] Age shift of the disease due to mass vaccination need also to be well understood before expansion of adult JE vaccine in endemic areas.

CONCLUSION

There is an urgent need of establishing quality surveillance along with availability of diagnostic facility at district health centers of identified endemic districts forestimation of prevalence and reevaluation of the policy of mass JE vaccination in the country. There is a need for more targeted use of available JE vaccines in affected areas and its effects on overall disease burden reduction along with mass vaccination implications on epidemiological shift. Research on other cost effective measures including veterinary based surveillance, control of amplifying hosts and health education & communication for behavioural change to prevent and control the disease burden must also be encouraged.

REFERENCES

1. Background paper on JE Vaccines- SAGE working group. Available at http://www.who.int/immunization/sage/meetings/2014/october/1_JE_Vaccine_Background_Paper.pdf?ua=1, accessed November 2014.
2. Griffiths MJ et al. Japanese encephalitis virus infection. In Tselis A, Booss J, editors. Handbook of Clinical Neurology. Vol 123 (3rd series) Neurovirology, pp. 551–576.
3. Shlim DR, Solomon T. Japanese encephalitis vaccine for travelers: exploring the limits of risk. Clin Infect Dis. 2002 Jul 15;35(2):183-8. Epub 2002 Jun 19.
4. Campbell GL et al. Estimated global incidence of Japanese encephalitis: a systematic review.Bull World Health Organ. 2011;89(10):766–774.
5. Mathers CD et al. Measuring the burden of neglected tropical diseases: the global burden of disease framework. PLoS Negl Trop Dis,2007;1(2) e114.
6. Hossain MJ et al. Hospital-based surveillance for Japanese encephalitis at four sites in Bangladesh,2003-2005. Am J Trop Med Hyg, 2010;82(2):344–349.
7. Operational Guidelines: National Programme for Prevention and Control of Japanese Encephalitis/ Acute Encephalitis Syndrome, Government of India, Ministry of Health & Family Welfare, Directorate General of Health Services, National Vector Borne Disease Control Programme, 2014.
8. Liu W et al. Risk factors for Japanese encephalitis: a case-control study. Epidemiol Infect, 2010;138(9):1292–1297.
9. Partridge J et al. Endemic Japanese encephalitis in the Kathmandu valley, Nepal. Am J Trop Med Hyg. 2007; 77(6): 1146–1149.
10. Kumari R et al. First indigenous transmission of Japanese Encephalitis in urban areas of National Capital Territory of Delhi, India. Trop Med Int Health. 2013;18(6):743–749.
11. Operational Guide, Japanese Encephalitis Vaccination in India, MOHFW October 2014.
12. Vashishtha VM, Ramachandran VG. Vaccination Policy for Japanese Encephalitis in India: Tread with Caution!. Indian Pediatr. 2015 Oct;52(10):837-839.
13. Group of Ministers (GoM) vide Cabinet Secretariat's order no. 241/1/5/2011-CAB dated 4th November, 2011 by Govt. of India.
14. Minutes of National Technical Advisory Group on Immunization: Standing Technical Sub-Committee meeting December 17th, 2013.
15. Directorate of National Vector Borne Disease Control Program- Delhi. Details of AES/JE Cases and Deaths from 2008-2014. Available from: http://nvbdcp.gov.in/Doc/jeaes-cd-May15.pdf. Accessed Jan 8, 2018.
16. Group of Ministers (GoM) vide Cabinet Secretariat's order no. 241/1/5/2011-CAB dated 4th November, 2011 by Govt. of India.