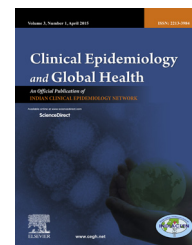


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Original Article

Hospital based surveillance for Japanese encephalitis in Lucknow, India – 2011–2013: Need for more JE vaccination?



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ABSTRACT

Introduction: Acute encephalitis syndrome (AES) continues to occur in the state of Uttar Pradesh in northern India despite the vaccination drives against Japanese encephalitis (JE) in recent years. The prevalence of JE has decreased in other regions of the state which were hitherto the epicenter of this infection.

Objective: To conduct a hospital based surveillance for JE from among children presenting with AES in Lucknow, the capital of Uttar Pradesh.

Methodology: Children between 6 months and 14 years of age admitted with AES to the Childrens' wards of out teaching hospital in Lucknow, over a period of 29 months (July 2011–November 2013) were subjected to a standardized work up. IgM antibodies against JE in cerebrospinal fluid and serum were tested for by the Panbio Combo (JE & Dengue) kit and National Institute of Virology ELISA kit.

Results: A total of 1586 patients with AES were admitted to the pediatric wards in the study period, of which 1070 were tested for JEV IgM and 238 (22.2%) were positive. JE positivity was found almost exclusively in monsoon and postmonsoon season and patients came from 22 surrounding districts.

Conclusions: AES and JE continue to be an important cause of hospitalization in children in Lucknow, which highlights the need for further vaccination drives in this region.

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1. Introduction

Japanese encephalitis virus (JEV), a mosquito-borne pathogen of the family Flavivirus (genus *flaviviridae*), is the most common cause of epidemic and endemic viral encephalitis

in Asia.¹ In India, the first cases were reported from the southern state of Tamil Nadu in the 1950s.² The state of Uttar Pradesh saw its first JE epidemic in 1978³ and since then, there have been annual monsoon and post monsoon outbreaks of the disease affecting mainly the northeastern districts of the state with epicenter being Gorakhpur and the surrounding

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districts – the 'terai' region.^{4–7} JE is reported from 24 states and Union Territories of India, but Uttar Pradesh contributes to roughly 75% of cases of JE in the country. Our hospital in Lucknow, the capital city of Uttar Pradesh, has also been receiving patients of encephalitis mainly in monsoon and post monsoon season every year for the last 3 decades.^{7–9} However, being situated in the central part of the state our patients come from about 20 to 25 eastern districts of the state and not from the Gorakhpur region.¹⁰ In 2006 WHO coined the term 'Acute Encephalitis Syndrome' or AES to denote an encephalitis like illness due to any etiology.¹¹

In August–September 2005, a severe epidemic of JE, with 6061 cases and 1500 deaths, occurred in Uttar Pradesh.^{7,12} Again, the epicenter of this epidemic was the Terai region of the state.¹³ As in previous years, our hospital received JE patients during the epidemic from the 20 odd eastern districts of the state.⁷ After this epidemic, the Government of India decided to go in for large scale campaign style vaccination of the susceptible population, covering children aged 1–15 years with the Chinese live attenuated vaccine derived from the SA-14-14-2 strain. There were four such JE vaccination rounds from 2006 to 2009, which covered 34 districts of the state.¹²

Surprisingly however, acute encephalitis continues to dog the state even after the vaccination drive. Since 2006, the Gorakhpur region has witnessed a change in the etiological pattern of the AES, however. JE is now seen less frequently – in only about 13% while enteroviruses (EV-89 and EV-76) were reported in another 22%.¹⁴ Our hospital also continues to receive patients with AES. We have been conducting hospital based surveillance of JE among patients with AES. This communication reports the pattern of JE in AES patients as seen in Lucknow since 2011.

2. Methodology

The study was conducted at the Department of Pediatrics and Microbiology, King George Medical University (KGMU), Lucknow. Lucknow is the capital city of the state of Uttar Pradesh or the 'northern state' which is India's most populous state (~200 million – approximately one-sixth of the country's population) and one of the poorest, with low human development indices and a large rural, rice growing population. The state has a population density of 828 people per square kilometer, with about 75% (155.11million) living in rural areas.¹⁵ The state is divided into 70 districts or administrative units.

From July 2011 to November 2013, children beyond 6 months of age presenting with AES to the Department of Pediatrics, KGMU were subjected to a standardized work up. All the patients were examined according to a predesigned protocol that included demographic information, clinical history, complete clinical and neurological examination, and investigations. Patients were followed up daily till death, discharge or otherwise leaving the hospital.

2.1. Investigative work up

In addition to blood counts, biochemistry and culture, findings of lumbar puncture if done by the treating team were recorded in terms of cerebrospinal fluid (CSF) cell count (total and

differential), protein and sugar content, Gram stain and bacterial culture. Blood and CSF samples were also transported to the Indian Council of Medical Research (ICMR) Grade-1 Virology Laboratory at the Department of Microbiology, KG Medical University for virological and serological tests for JE. Neuroimaging was done by cranial computerized tomography whenever possible.

2.2. Serological tests

From July 2011 to August 2012, IgM capture ELISA test for anti JEV IgM antibodies were performed in serum with the Panbio JE – Dengue Combo kit (Australia) using the manufacturer's protocol. This kit has a reported sensitivity and specificity for JE in serum of 89.3% and 99.2% respectively.¹⁶ From August 2012, both CSF and serum were collected whenever possible. For CSF, National Institute of Virology (NIV) kit was used and interpreted according to the manufacturer's protocol. Reported sensitivity and specificity in CSF is 75% and 96% respectively.¹⁷ If for some reason, CSF was not collected then the IgM ELISA test was done in serum only. If the initial CSF or serum result was negative or equivocal, it was also repeated in serum after an interval of 7–10 days. Testing in serum was done by the Panbio JE – Dengue Combo kit. In 60 patients, the IgM result was cross confirmed by both kits.

3. Results

Over a period of 29 months, from July 2011 to November 2013, a total of 1586 patients with AES were admitted to the pediatric wards. Of these, 516 patients could not be enrolled in this study either because they did not meet our inclusion criteria (age less than 6 months or clinical history longer than 14 days) or died, left the hospital against medical advice (LAMA) or absconded soon after admission. So, a total of 1070 children were tested for JE virus IgM antibodies in either in CSF or serum.

3.1. Testing in 1st sample

Of 1070 samples tested, 766 samples were CSF in which 120 were IgM positive and 47 were equivocal. The remaining 304 were serum samples of which 112 were JE IgM positive and 15 had equivocal results.

3.2. Testing in 2nd sample

In a total of 114 patients in whom initial samples tested either negative or equivocal, 2nd samples tested for JE IgM. All these samples were serum which was taken after 7–10 days. Of the 114 2nd samples, 6 were JE IgM positive while 1 showed equivocal result.

So after evaluating the results of 1st and 2nd samples we found that 238 (22.2%) patients were JE IgM positive (Table 1).

Sixty samples were tested by both the kits and there was concordance in all but one who was equivocal by NIV kit and negative by the Panbio kit.

Fig. 1 shows the monthwise prevalence of AES and JE patients. Clear peaks for JE in the monsoon and post monsoon season are observed. Fig. 2 shows that JE positive patients

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