

Management of Acute Encephalitis Syndrome Endemic during COVID-19 Pandemic in India

Praveen Kumar¹, Manish Taywade²

¹India Meteorological Department, Ministry of Earth Sciences, New Delhi, India

²Department of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar, India

Corresponding Author: Manish Taywade

ABSTRACT

The second wave of COVID-19 has worst impacted the country like India. However, the third wave is much predicted and may be infection among the children at risk. The endemic of diseases that outbreak from time to time in particular regions of India have shown several challenges to the health system in the past. The most likely endemic is Acute Encephalitis Syndrome (AES) for few states of India that is reported during the pre-monsoon and post-monsoon season. However, AES had the highest chances of being found in pediatric age only with very few exceptions. The symptoms are confusing for diagnosing COVID-19 patients, and a great fear that the symptoms may overlap with AES. The sudden outbreak of AES during the current COVID-19 pandemic may intersect the demand for health resources, oxygen and isolated beds. The common insistence among the AES and COVID-19 patients will be oxygen demands, wards-bed (in NICU, PICU) and drugs. Hence, early preparedness is of utmost demand, simultaneously strengthening health infrastructures in this aspect is obvious.

Keywords: Acute Encephalitis Syndrome, AES, COVID-19 pandemic in India

1. BACKGROUND

Acute Encephalitis Syndrome (AES) has a significant public health concern and remains mysterious with few known possible aetiology (1–3). The symptoms of AES usually include acute onset of fever with a change in mental status that may lead to disorientation, coma, or inability to talk and seizures (2,4). AES had the highest chances of being found in paediatric age only with very few exceptions. The epidemics of AES have been being reported in Indian states from time to time. As per the National Vector Borne Disease Control Programme (NVBDCP) report, most of the AES cases were reported from the states of Manipur, Tripura, Assam, West Bengal, Odisha, Tamilnadu, Karnataka, Uttar Pradesh and Bihar. These states are deprived of health infrastructures.

Approximately 375 million population of India are at risk of AES. However, the districts of Uttar Pradesh and Bihar are highly susceptible to AES and have witnessed several deaths in the last decade (5).

In the past, the tested samples from AES patients reported either virus (JEV, enteroviruses, dengue, Chandipura, parvovirus, West Nile, herpes simplex) the non-virus (scrub typhus, protozoa, fungus) agents. The AES cases with confirmed aetiology ranged from 38%-85% in some selected districts of Uttar Pradesh (1). In another study, the clinical examinations (of cerebrospinal fluid and blood serum) among 407 hospitalized AES patients revealed that 65.4%, 10.3%, and 7.1% were diagnosed with scrub typhus, JEV, and dengue virus, respectively and rest were found with no

aetiology for the aforementioned tested virus (6). However, no aetiology, including JEV, Nipah, West Nile, and Chandipura virus, was diagnosed in the samples of patients from Muzaffarpur, Bihar yet (3). The aetiology of AES may also be multifactorial such as poverty, environmental, weather, socio-economic, sanitation, hygiene status of surroundings, etc. (7). Sometimes the economic and social factors were also blamed for AES occurrences, which were considered essential factors (5). This also signifies the reliance of AES patients on the government prepared infrastructure. The AES patient with unknown aetiology remains a challenge to the health practitioner and health manager. If the AES not detected in time, it could lead to brain damage, which may require long-term supportive care and therapy. More often, the AES cases start to report by mid of May and attain the peaks in June/July of the year (4) and remain seasonal.

Coronavirus Disease 2019 (COVID-19) is caused by the deadliest virus SARS-CoV-2, which was first reported (epidemic) in a city of China and became pandemic in March 2020 (WHO). The primary source of transmission of this virus from human to human is respiratory droplet and possible by faecal-oral and aerosol contact (8). The intersecting crisis of Covid-19 and AES could limit the health systems ability to respond to pre-existing problems.

2. Diagnosis of AES cases

2.1. Based on clinical/physical conditions

Clinically a case defined as a person of any age, at any time of year with acute onset of fever, not more than 5-7 days of duration and change in mental status with or without (including symptoms such as confusion, disorientation, coma or inability to talk) AND/OR new onset of seizures (Excluding simple febrile seizure). Other clinical findings are irritability, abnormal behaviour apart from normal or usual febrile illness. Apart from physical diagnosis, the biological sample from the case must be

diagnosed with laboratory tests (Directorate of National Vector Borne Diseases Control Programme 2006; National Programme for Prevention and Control of Japanese Encephalitis/Acute Encephalitis Syndrome 2014).

2.2. Based on laboratory supports/tests

In the sentinel surveillance network, AES/JE will be diagnosed by IgM Capture ELISA, and virus isolation will be done in the National Reference Laboratory. However, a suspected case with any one of the following markers may be identified with AES: Presence of IgM antibody in serum and/or CSF to specific virus including JE/Enterovirus or other virus or others, the fourfold difference in IgG antibody titer in paired sera, isolation of virus from brain tissue, antigen detection by immunofluorescence, nucleic acid detection by PCR. Probable Cases defined as a suspected case in close geographic and temporal relationship to a laboratory-confirmed case of AES/JE in an outbreak. AES due to other agents defined as a suspected case in which diagnostic testing is performed, and an aetiological agent other than AES/JE is identified. Acute Encephalitis Syndrome due to unknown agent as a suspected case in which no diagnostic testing is performed /no aetiological agent is identified/test results are intermediate.

3. Overlapping of symptoms, signs, and Management of AES during COVID-19 Pandemic

AES outbreak reported from time to time in the limited area of India and caused several morbidity and mortality. The third wave indications by various researchers all over the globe. According to researchers, the children (below age 18yrs) will be worst affected in the third wave. However, the second wave of COVID-19 is itself dreadful and causes high mortality and morbidity. This is also a challenge for children below age ten years to teach them COVID appropriate behaviours. The other challenge,

current vaccines are not licensed to be administered to children. Although the primary target of coronavirus is the lungs, it is familiar that this causes injury to the brain too. The coronavirus is associated with respiratory distress syndrome, severe metabolic syndrome, electrolyte imbalance, cardiac events, thromboembolic syndrome, neurological syndrome (11–14). Beijing Ditan reported the first case of viral encephalitis associated with COVID-19 in March 2020. The researcher confirmed the presence of SARS-CoV-2 in the cerebrospinal fluid (CSF) by genome sequencing (15). SARS CoV has the potential to induce neurological disease includes polyneuropathy, encephalitis, ischemic stroke (14). The SARS CoV2 and SARS CoV have 79.5% genetic similarity, while in bat coronavirus is as high as 96% (16). In the present scenario, the neurological also present in few patients. The patients were having a headache, disturbed consciousness (17).

4. Need to strengthen the service to AES and COVID 19

There is an urgent need to strengthen the surveillance, vector control and case management. Timely referral of severe and complicated cases are also equally important. However, this is very well understood that COVID-19 may have a great and negative impact on such management. Need to strengthen the WASH Program including accessibility of safe drinking water and proper sanitation facilities to target the population in rural and urban areas.

5. Hospital Management of AES

Identification of early danger signs reduces morbidity, mortality and provides prompt referral hospitalization with first-line management at the grassroots level. The treatment depends on the status of the patient at the time of arrival. Generally, patients present with high-grade fever with altered sensorium and mental status or convulsion. The first foremost is an

assessment of the patency of the airway in such patients. The treatment at all facilities from primary to tertiary level is similar. The referral may arise with the lack of facilities in primary care settings. The oxygen facility is a key determinant and vital for management. Management of airways, breathing, and circulation is the first step, with control of fever, intracranial pressure (if raised), associated convulsions. The other management is also essential, including the fluids and electrolytes, nutrition and calories, and the specific treatment of any underlying cause. Investigations, sample collections and transportation to identify the aetiology of AES is important during the hospital stay. Reporting the case(s) under integrated surveillance program and rehabilitation planning is also needed to take care.

6. Pediatric Intensive Care Unit (PICU)

Pediatric Intensive Care is required in severe cases where multisystem involvement occurs, particularly nervous system, respiratory system and cardiovascular systems. In the predicted third wave of COVID-19 may impact the children primarily. The intensive care may be jeopardized with the management of AES and COVID-19. The common insistence among the AES and COVID-19 patients will be oxygen demands, sharing of wards (in NICU, PICU), common drugs. We do not have enough pediatric Covid care wards and intensive care units for children. The symptoms are unknown for diagnosing COVID-19 patients, and a great fear that the symptoms may coincide with AES. This may mislead the health practitioner to diagnose, isolate and treat the AES patient or AES with COVID-19.

7. CONCLUSION

The SARS CoV-2 and AES both are affecting the nervous system as per current literature. Both are life-threatening disease with a high burden on the health system. Upcoming a few months are crucial in the health of children in both deadly infections.

Early diagnosis and management of neurological manifestation will impact morbidity and mortality in COVID and AES cases. The appropriate and timely intervention, mitigation of the health system and health professionals is vital.

Conflicts of Interest: The author declare that they have no conflicts of interest.

Funding Statement: There is no funding support.

Ethical Approval: None

Acknowledgement: Nil

Contributions of Authors: All authors are equally contributed.

REFERENCES

1. Jain P, Jain A, Kumar A, Prakash S, Khan DN, Singh KP, et al. Epidemiology and etiology of acute encephalitis syndrome in North India. *Jpn J Infect Dis.* 2014;67(3):197–203.
2. Nath V, Sharma S, Barman K. Acute Encephalitis Syndrome and its alleged litchi (*Litchi chinensis*) connection - A review and status. *Indian Journal of Agricultural Sciences.* March 2016;86(3).
3. Sahni GS. The recurring epidemic of heat stroke in children in Muzaffarpur, Bihar, India. *Ann Trop Med Public Heal.* 2013;6(1):89–95.
4. Kumar P, Pisudde PM, Sarthi PP, Sharma MP, Keshri VR. Status and trend of acute encephalitis syndrome and Japanese encephalitis in Bihar, India. *Natl Med J India.* 2017;30(6):317–20.
5. Sen PK, Dhariwal AC, Jaiswal RK, Lal S, Raina VK, Rastogi A. Epidemiology of acute encephalitis syndrome in India: Changing paradigm and implication for control. *J Commun Dis.* 2014;46(1):4–11.
6. Mittal M, Bondre V, Murhekar M, Deval H, Rose W, Verghese VP, et al. Acute Encephalitis Syndrome in Gorakhpur, Uttar Pradesh, 2016: Clinical and Laboratory Findings. *Pediatr Infect Dis J.* 2018;37(11):1101–6.
7. Potharaju NR. Incidence rate of acute encephalitis syndrome without specific treatment in India and Nepal. *Indian J Community Med.* 2012;37(4):240–51.
8. Dos Santos WG. Natural history of COVID-19 and current knowledge on treatment therapeutic options. *Biomed Pharmacother.* 2020 Sep;129:110493. doi: 10.1016/j.biopha.2020.110493. Epub 2020 Jul 3. PMID: 32768971; PMCID: PMC7332915.
9. 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.
10. Directorate of National Vector Borne Diseases Control Programme. Guidelines (With Special Reference To Japanese Encephalitis). 2006;2006(November):1–28.
11. Liu K, Chen Y, Lin R, Han K. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . 2020;(January).
12. Lau K, Yu W, Chu C, Lau S, Sheng B. Infection by SARS Coronavirus. *Emerg Infect Dis.* 2004;10(2):2–4.
13. Wu Y, Xu X, Chen Z, Duan J, Hashimoto K, Yang L. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . 2020;(January).
14. Tsai LK, Hsieh ST, Chang YC. Neurological manifestations in severe acute respiratory syndrome. *Acta Neurol Taiwan.* 2005;14(3):113–9.
15. Xiang P, Xu XM, Gao LL, Wang HZ, Xiong HF, Li RH, et al. First case of 2019 novel coronavirus disease with encephalitis. *ChinaXiv.* 2020;202003:15.
16. Wu A, Peng Y, Huang B, Ding X, Wang X, Niu P, et al. Genome Composition and

Divergence of the Novel Coronavirus (2019-nCoV) Originating in China. *Cell Host Microbe*. 2020;27(3):325–8.

17. Mao L, Wang M, Chen S, He Q, Chang J, Hong CD, et al. Neurological manifestations of hospitalized patients with COVID-19 in Wuhan, China: A retrospective case series study. medRxiv. 2020

How to cite this article: Kumar P, Taywade M. Management of acute encephalitis syndrome endemic during COVID-19 pandemic in India. *Int J Health Sci Res*. 2021; 11(12):162-166. DOI: <https://doi.org/10.52403/ijhsr.20211222>
