EMERGING THREAT: FIRST CASE OF WEST NILE VIRUS ENCEPHALITIS IN PESHAWAR, PAKISTAN

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ABSTRACT

West Nile Virus (WNV), once confined primarily to Africa, is now an emerging communicable disease in Pakistan. Clinical cases and serological evidence of WNV infection have been documented in both human and animal populations in the Punjab and Sindh provinces of Pakistan. We report the first case of WNV encephalitis in an 80-year-old hypertensive and diabetic lady from district Peshawar. Sadly, the patient did not survive. This case highlights the importance of thinking of zebras in addition to horses when confronted with the sound of hoofbeats, as 'zebra diagnoses' do exist. Clinicians shall consider novel infections when evaluating patients with fever and altered mental status.

KEYWORDS: *West Nile Virus, Flavivirus, Arboviruses, Encephalitis, Meningoencephalitis, Emerging Communicable Diseases, Pakistan*

INTRODUCTION

There are many causes of encephalitis, including viral infections and autoimmune disorders like systemic lupus erythematosus, post-vaccination, and paraneoplastic encephalitis. Viral infections are the most common cause of encephalitis. Herpes simplex virus 1, Herpes simplex virus 2, Japanese B encephalitis virus, St Louis encephalitis virus, and West Nile virus (WNV) are important viral encephalitides.[1] West Nile Virus is an arthropod-borne virus that primarily affects birds and is transmitted to humans by biting an infected female Culex mosquito. West Nile Virus was initially identified in the West Nile district of Uganda in 1937. Its life cycle is between mosquitoes and birds; however, sometimes human beings get infected with the virus, which is usually a dead end for the virus. Mosquitoes rarely get infected by human beings as the viremia is very short-lived. Additionally, humans can get WNV from a blood transfusion, solid organ transplantation, and trans-placentally.[2] While it was initially considered a disease limited to Africa, parts of Europe, and the Middle East, WNV has spread into Asia over the past two decades. India, Pakistan, and the Middle East have recorded a significant number of cases and outbreaks, contributing to the growing concern.[3,4] Climate change, frequent floodings, the war on terror, and political instability leading to internally displaced people contribute to the changing epidemiology of infectious diseases, including the WNV.[5] The human disease ranges from asymptomatic seroconversion mild febrile illness (West Nile fever) to severe encephalitis leading to disability and death. The risk factors for severe neuroinvasive disease are advanced age, diabetes mellitus, and immunosuppression. Diagnosis is confirmed by IgM antibody capture enzyme-linked immunosorbent assay (MAC-ELISA) on the cerebrospinal fluid or blood. Serological tests may be negative in immunocompromised patients who may need polymerase chain reaction (PCR) to detect viral ribonucleic acid. However, PCR is positive in the first three to four days of viremia. There is no specific treatment or vaccine for the human infection.[2] We report a case of WNV encephalitis in an 80-year-old lady who had underlying comorbidities like hypertension and diabetes. The lady died due to the illness.

CASE REPORT

An 80-year-old female with a history of well-managed hypertension and diabetes mellitus presented to the emergency department with sudden-onset fever, chills, and confusion. The examination showed a temperature of 39^0C, a pulse of 112 beats per minute and regular, blood pressure of 150/95 mmHg, Glasgow come scale (GCS) of 9/15, there were no signs of meningeal irritation, and planter responses were flexor. The rest of the systemic examination was unremarkable. The patient's condition worsened over the next two days, and her GCS dropped to 6/15. Her investigations are summarized in Table 1. The cerebrospinal fluid analysis demonstrated lymphocytic pleocytosis, decreased glucose levels, and increased protein levels, suggesting viral encephalitis. Magnetic resonance imaging (MRI) of the brain revealed meningeal enhancement and small vessel ischemic changes (Figure 1). The cerebrospinal fluid PCR for Herpes simplex viruses and Nipah virus returned negative results, while WNV was detected on next-generation sequencing, confirming the diagnosis of WNV encephalitis. The patient was given supportive treatment, but her clinical condition continued to deteriorate. She died after a week's stay in the hospital.

Table 1: Laboratory Investigations of the Patient

Laboratory Investigations	Patient Value	Reference Range
Hemoglobin (g/dL)	12.7	11.5 – 17.5
White Blood Cells Count (x10^3/mcL)	13.7	4 – 11
Platelets (x10^3/mcL)	147	150 – 450
Blood Urea (mg/dL)	98	18 – 45
Serum Creatinine (mg/dL)	0.6	0.4 – 1.0
Serum Sodium (mEq/L)	137	135 – 145
Serum Potassium (mEq/L)	4.3	3.5 – 5.1
Serum Chloride (mEq/L)	99	96 – 112
Serum Total Bilirubin (mg/dL)	0.2	0.1 – 1.0
Serum Alanine aminotransferase (IU/L)	19.3	10 – 50
Serum Alkaline Phosphatase (IU/L)	99.3	35 – 104
Random blood sugar (mg/dL)	112	100 – 180
Serum C Reactive Protein (mg/dL)	11.9	< 0.5
PT (seconds)	12	12
APTT (seconds)	32	32
HBsAg (ELISA)	Non – Reactive	
Anti – HCV (ELISA)	Non – Reactive	
Anti – HIV (ELISA)	Non – Reactive	
DengueNS1 (ICT)	Negative	
Dengue IgM (ELISA)	Negative	
Urine RE		
White Blood Cells (/HPF)	2-3	0-5/HFP
Red Blood Cells (/HPF)	6-8	0-5/HFP
Glucose	Nil	Nil
Albumin	Nil	Nil
Casts	Nil	Nil
CSF analysis		
Protein (mg/dL)	112	15 – 45
Glucose (mg/dL)	49	50 – 80
White Blood Cells Count (/mm^3)	42	< 5
Red Blood Cells (/mm^3)	10	None

g/dL: Gram/deciliter, mcL: Microliter, mg/dL: milligram/deciliter, mEq/L: milliequivalents per litre, IU/L: International unit/litre, PT: Prothrombin time, APTT: Activated partial thromboplastin time, HBsAg: Hepatitis B surface antigen, Anti – HCV: Hepatitis C antibodies, Anti – HIV: Human Immunodeficiency Virus antibodies, ELISA: Enzyme-linked immunosorbent assay, NS: Non-structural Protein, ICT: Immunochromatography, HPF: High power field, mm^3: Cubic millimetre

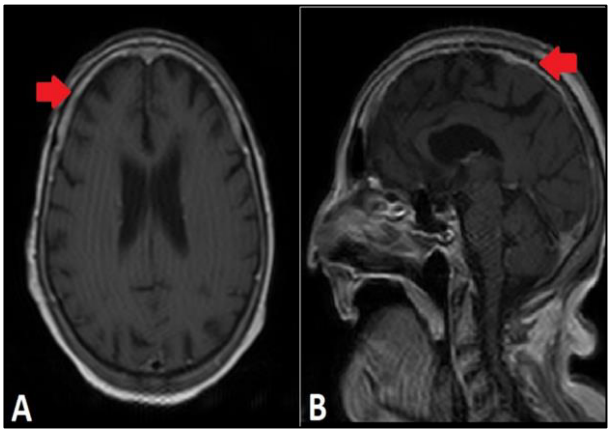

Figure 1: T1 weighted–contrast-enhanced MRI brain showing patchy meningeal enhancement (arrows) on axial (A) and sagittal (B) views

DISCUSSION

The West Nile Virus is known for its ability to cause neuroinvasive diseases, including encephalitis. It has been increasingly reported in various parts of the world. Zohaib et al. have reported 81·5% and 49.6% seroprevalence of WNV among horses and donkeys in Punjab and Khyber Pakhtunkhwa provinces of Pakistan, respectively.[6] Human seropositivity for WNV in Pakistan has been reported since 1982.[7] Erum et al. reported 105 IgM-positive cases of WNV out of 997 suspected cases of fever of undifferentiated origin from Karachi. Out of these 105 cases, 71 cases also had WNV-specific neutralizing antibodies.[8] West Nile virus infection has a seasonal variation with a peak incidence in September and October as the climate favours the breeding of Culex mosquitos.[3] West Nile virus belongs to flaviviruses, including dengue and Japanese encephalitis. There is cross-reactivity among the flaviviruses, which makes the serological diagnosis very difficult.[9] The presence of positive IgM is not

confirmatory due to cross reactivity. Reverse transcriptase PCR is not very helpful as the viremia is usually only in the initial three to four days before the symptomatic stage.[8] Plaque reduction assay is the absolute confirmation test, which is cumbersome and requires highly skilled infrastructure currently unavailable in Pakistan.[3] This is the first reported case of human WNV encephalitis from the Khyber Pakhtunkhwa, Pakistan province. The patient was 80 years old, diabetic, and hypertensive, and she succumbed to the illness. It is consistent with published data on the poor prognostic factors and mortality of WNV encephalitis.[10] The treatment is mainly supportive, as no approved vaccines or medications against WNV infection exist. Wearing a long-sleeved shirt and full-length trousers, using repellents and mosquito nets, vector control, and intensive surveillance are the cornerstones in combating WNV infections. For each symptomatic case, there are usually 250 cases in the community that need screening for disease surveillance.[3] Following the dissolution of the Federal Ministry of Health, there is no proper record of many communicable diseases, including WNV. The provincial health department should be more proactive in surveilling communicable diseases like Extensively drug-resistant (XDR) Salmonella typhi, Crimean Congo Hemorrhagic fever, Nipah virus infections, and WNV infections.

CONCLUSIONS

This case report serves as the first documented evidence of West Nile Virus encephalitis in the Khyber Pakhtunkhwa province of Pakistan. It emphasizes the necessity of considering WNV as a potential cause of fever and altered mental state, particularly in regions where the virus is not commonly reported. Early recognition and timely intervention in the form of isolation and contact tracing are crucial in managing this potentially life-threatening condition.

CONFLICT OF INTEREST: None

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REFERENCES

1. Ellul M, Solomon T. Acute encephalitis - diagnosis and management. Clin Med (Lond). 2018;18(2):155-9.
2. Habarugira G, Suen WW, Hobson-Peters J, Hall RA, Bielefeldt-Ohmann H. West Nile virus: an update on pathobiology, epidemiology, diagnostics, control and "one health" implications. Pathogens. 2020;9(7).
3. Waseem S, Shaikh TG, Ahmed SH, Usama RM, Asghar MS, Tahir MJ. West Nile virus outbreak in Pakistan: another potential public health threat in the pipeline? Ann Med Surg (Lond). 2022;77:103663.
4. Chowdhury P, Khan SA. Global emergence of West Nile virus: threat & preparedness in special perspective to India. Indian J Med Res. 2021;154(1):36-50.
5. Kashif N, Iqbal S, Ahmad R, Ahsan A, Khan NA, Shah SA. Evaluation of thrombocytopenia and anemia along with seasonal variations in dengue fever. Khyber J Sci. 2021;14(1):25-30.
6. Zohaib A, Saqib M, Beck C, Hussain MH, Lowenski S, Lecollinet S, et al. High prevalence of West Nile virus in equines from the two provinces of Pakistan. Epidemiol Infect. 2015;143(9):1931-5.
7. Hayes CG, Baqar S, Ahmed T, Chowdhry MA, Reisen WK. West Nile virus in Pakistan. 1. Sero-epidemiological studies in Punjab Province. Trans R Soc Trop Med Hyg. 1982;76(4):431-6.
8. Khan E, Barr KL, Farooqi JQ, Prakoso D, Abbas A, Khan ZY, et al. Human West Nile virus disease outbreak in Pakistan, 2015-2016. Front Public Health. 2018;6:20.
9. Endale A, Medhin G, Darfiro K, Kebede N, Legesse M. Magnitude of antibody cross-reactivity in medically important mosquito-borne flaviviruses: A systematic review. Infect Drug Resist. 2021;14:4291-9.
10. Santini M, Haberle S, Židovec-Lepej S, Savić V, Kusulja M, Papić N, et al. Severe West Nile virus neuroinvasive disease: clinical characteristics, short- and long-term outcomes. Pathogens. 2022;11(1).

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