

Prevalence and Molecular Detection of West Nile Virus (WNV) Among Renal Transplant Patients in Khartoum State, Sudan

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ABSTRACT

Background:

West Nile virus (WNV) is an arbovirus from Flaviviridae family. West Nile now represents one of the most common arboviral diseases worldwide that causes febrile illness. Also, significant number of patients develop severe neurological disease including meningitis, encephalitis, and acute paralysis. This study was carried out to detect the frequency of West Nile virus IgM antibodies and virus nucleic acid among renal transplant patients in Khartoum state.

Method:

This was a descriptive study, in which serum specimens were collected from 93 patient (68 male, 25 female) and investigated for WNV specific immunoglobulin M (IgM) using enzyme-linked immunosorbent assay (ELISA) and for WNV RNA using real time PCR (RT-PCR). The study group age ranged from 20 to 80 years.

Result:

Out of the 93 patients tested, 7 (7.5%) were positive for IgM and 86 (92.4%) were negative and no positive RT-PCR results were recorded.

Conclusion:

The frequency of West Nile virus among renal transplant patients in Khartoum State – Sudan was documented through detection of specific IgM antibodies.

Key words : West Nile Viruses (WNV), IgM, ELISA and Real-Time PCR.

I. INTRODUCTION

West Nile virus (WNV) is an arthropod transmitted virus (arbovirus) from the Flaviviridae family¹. It is closely related to a group of viruses that cause disease around the globe such as dengue fever, yellow fever, Japanese encephalitis and tick-borne encephalitis². WNV infection now represents one of the most common arboviral diseases worldwide³. Although most individuals with WNV infection are asymptomatic, a significant number of patients

develop severe neurological disease, including meningitis, encephalitis, and acute flaccid paralysis. Smith burn et al published the first report of neurotropic WNV infection in 1940 and isolated the virus from the blood of a woman with fever residing in the West Nile district of Uganda⁴. Subsequently, the virus became recognized as a cause of meningitis and encephalitis in elderly patients in Israel in the 1950s. Epidemics of WNV infection have been reported in many countries, including South Africa, France, Romania, India and Indonesia. In endemic

areas like Egypt, a 40% WNV seroprevalence rate has been described⁵. From 1937 until 1999, West Nile virus (WNV) garnered scant medical attention as a cause of febrile illness and sporadic encephalitis in parts of Africa, Asia, and Europe. After the surprising detection of WNV in New York City in 1999, the virus has spread dramatically westward across the United States, southward into Central America and the Caribbean, and northward into Canada, resulting in the largest epidemics of neuroinvasive WNV disease ever reported. From 1999 to 2004, >7,000 neuroinvasive WNV disease cases were reported in the United States. In 2002, WNV transmission through blood transfusion and organ transplantation was described for the first time, intrauterine transmission was first documented, and possible transmission through breast feeding was reported. This highlighted new information regarding the epidemiology and dynamics of WNV transmission, providing a new platform for further research into preventing and controlling WNV disease. The disease is transmitted to humans by the bite of infected mosquitoes. Birds act as amplifying hosts and infect mosquitoes, which then transmit disease to other birds. Humans, horses, and other non avian vertebrates are incidental hosts. *Culex* mosquitoes are the principal WNV vectors, but other mosquito species have been demonstrated as WNV carrier's most non-avian species, including humans infected with WNV do not generally contribute to viral spread. This is because most develop transient and insufficient viremia to infect mosquitoes and contribute to the virus's cycle in nature⁷. A possible dialysis-related and blood transfusion transmission of WNV was recorded in USA. The present study aimed to investigate the seroprevalence of West Nile Virus among hemodialysis patients in Khartoum State – Sudan.

II. MATERIAL AND METHODOLOGY

STUDY AREA:

The study was conducted in Khartoum State during the period November 2015 to June 2016.

Inclusion Criteria Patients and Sample:

Renal transplant recipients, who were not treated with antiviral therapy, were recruited into this study. These participants were recruited through the Ibin Sina Hospital and Dr. Salma Center for Transplantation and Haemodialysis, Khartoum State, between August and September of 2016.

Blood Sample Collection:

Blood samples were collected from 93 renal recipient patient with age ranging from 20 years to 80 years old. Blood (2-5 ml) was collected in plain containers and transported on wet ice to the laboratory for immediate processing. Sera were separated from blood samples by centrifugation for 5 minutes at 3000 RPM. Obtained sera were used for ELISA and RNA extraction for real-time PCR.

IgM Capture ELISA:

Serum samples were tested for the presence of WNV IgM antibodies using 3rd generation commercially available ELISA kits (GENESIS Diagnostic, Omega Diagnostic Group PLC, Cambridge Shine, UK), according to the manufacturer's instruction.

RESULT:

A total of 93 renal transplant patients were enrolled in this study. Their ages ranged from 20 to 80 years, the results revealed that 7 patients (7.5%) were positive for WNV IgM while 86 (92.4%) were negative. Three (42.8%) of positive patients were females and 4 (57.1%) were males.

None of the 93 patients was proved to be positive for WNV RNA using RT-PCR.

ELISA WNV IGM

Table 1. results of IgM Elisa in 93 renal transplant patients

Group test	No	Positive result	Negative result
Renal transplant patient	93	7(7.5%) Males: 3(57.1%) Females: 4 (42.8%)	86(92.4%)

Table 2. Results of Rt-PCR in 93 renal transplant patients

Group test	No	Positive	Negative
Renal transplant patient	93	0(0%)	93 (100%)

III. DISCUSSION

Most human infections with WNV are a symptomatic. Symptomatic infections may vary from flu-like malaise to serious neuroinvasive disease for which there is no specific treatment. Fewer than 1% of human infection progress to severe disease for which the most reported risk factors include advanced age, immune suppression, chronic medical conditions hyper tension, diabetes and chronic renal failure¹⁰.

The aim of this study was to determine prevalence of WNV using IgM ELISA and Real-time PCR among renal transplant recipients in Khartoum state.

The present study was the first survey of WNV prevalence and molecular detection in renal transplant recipients in Khartoum state. This study revealed that the prevalence of WNV in renal transplant recipient is 7.5%, we can only compare our result to past outbreak in the Treviso province, The kidney recipient was the first confirmed case of WNV infection notified in northeastern Italy in 2011, and the first case of WNV infection in a cluster of four transplant recipients who acquired the infection from a common organ donor. The organ

donor, whose WNV infection was only retrospectively diagnosed by IgM detection, Screening of blood prior to organ recovery did not show detectable levels of WNV nucleic acid with the use of quantitative real-time polymerase chain reaction.

The detection of IgM in some of the patients in this study indicates WNV activity in the area and we suggest that pre-procurement screening of renal donors by testing blood with both WNV IGM capture ELISA and a sensitive nucleic acid testing should be done before transplantation.

IV. REFERENCES

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