



## Short Communication

# Febrile Illnesses Diagnosis in Senegal in the Context of COVID-19 Pandemic

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**Received:** 13 July 2021; **Accepted:** 17 August 2021; **Published:** 31 August 2021

**Citation:** Martin Faye, Cheikh Tidiane Diagne, Mamadou Aliou Barry, Modeste Faye, Oumar Ndiaye, Gamou Fall, Oumar Faye, Ndongo Dia, Amadou Alpha Sall and Ousmane Faye. Febrile Illnesses Diagnosis in Senegal in the Context of COVID-19 Pandemic. Archives of Clinical and Medical Case Reports 5 (2021): 618-621.

**Keywords:** COVID-19; Febrile Illnesses; Arboviruses; Rift valley fever virus; West Nile virus

### 1. Introduction

Amidst the current COVID-19 pandemic, the world still needs to deal with the burden of various other diseases that present overlapping occurrences [1]. Although extraordinary efforts have been made to finding effective countermeasures

for preventing COVID-19 infection and or treating patients with COVID-19, few attentions was given to look at situations of SARS-CoV-2 coinfection with arthropod-borne viruses (arboviruses) that are already endemic in tropical and subtropical regions, and present in some temperate regions [2]. Arboviruses represent a great repertoire of viruses that can cause several diseases in humans [3]. Recently, they have expanded significantly including a high number of

viruses isolated from mosquitoes and phlebotomine sandflies including the *Phlebovirus* and *Flavivirus* genera [4, 5].

Rift valley fever virus (RVFV) is a bunyavirus endemic throughout the African continent and causing mass abortions and deaths in newborn kids and lambs. It is transmitted mainly between domestic ruminants and mosquitoes belonging to the *Culex* and *Aedes* genera. Mainly caused by virus exposure after abortion or slaughtering of viremic animals, the human disease is often limited to a flulike syndrome, but may evolve to severe forms such as hemorrhage, meningoencephalitis, and retinopathy with fatal outcomes [6].

West Nile virus (WNV) is a flavivirus first isolated from blood sample of a febrile woman in 1937 in Uganda. Its enzootic cycle involves mainly birds and mosquitoes of the *Culex* genus. Humans and horse are incidental hosts. The human infection can range from asymptomatic infections or mild acute febrile illness, to neurological forms including meningitis, encephalitis, and acute flaccid paralysis. With a global distribution, WNV is currently an important public health concern in Europe and the Americas where it continues to spread causing noteworthy outbreaks in humans with a neurological hallmark [7].

## 2. Case Study

During the COVID-19 pandemic, a total of 31 patients who have consulted at the health care of Rosso-Senegal sentinel site for a suspicion for COVID-19 infection from July 26<sup>th</sup>, 2020 to September 29<sup>th</sup>, 2020 and presented simultaneously clinical signs of arboviral diseases, was screened also for arboviruses. Rosso-Senegal is a trading hub of more than 10 thousands of people, located at 365 kilometers from Dakar (16°30'00"N, 15°49'00"W), in Northern Senegal (Richard-

Toll health district, Saint-Louis region). At the border between Senegal and the Republic of Mauritania, Rosso-Senegal is separated from its twin Rosso-Mauritania by the Senegal River which is crossed using a ferry. Rosso-Senegal is closed to the Republic of Mauritania where are circulating arboviruses such as RVFV as well as the ornithologic Djoudj Park, located in Northern Senegal, which is a major wintering site for birds migrating from Europe. Migratory birds are believed to play an pivotal role in movements of viruses, such as WNV, between Europe and Africa.

Nasopharyngeal samples were collected from the 31 COVID-19 suspected patients for detection of SARS-COV-2 by RT-PCR (Cepheid GeneXpert® SARS-COV-2 technologie). Living in a tropical zone where arboviruses circulation is almost always reported, blood samples were also collected from all patients and tested for viral RNA and IgM against RVF, Chikungunya, Dengue, West Nile, Yellow fever, Zika, and Crimean-Congo hemorrhagic fever viruses by real time reverse-transcription Polymerase Chain Reaction (RT-PCR) and enzyme-linked immunosorbent assay (ELISA) [8], respectively, and for SARS-COV-2 antibodies using the COVID-19 IgA/IgM/IgG RDT (*DIATROPIX*).

An overall rate of 38.7% (12/31) of patients tested positive for SARS-COV-2 RT-PCR and 4 out of these 12 confirmed COVID-19 cases exhibited SARS-COV-2 antibodies including 2 patients IgA/IgM positive, 1 patient IgM/IgG positive and 1 patient IgM positive. In addition, 16.12% (5/31) of the patients RT-PCR negative were positive for SARS-COV-2 antibodies with 2 patients IgA/IgM/IgG positive, 1 patient IgM/IgG positive, 1 patient IgA/IgM positive and 1 patient IgM positive. All the 31 blood samples tested negative for RNA detection of the 7 arboviruses.

However, among the COVID-19 confirmed cases, one blood sample was positive for RVF IgM and one for WNV IgM/PRNT. In summary, we identified one patient SARS-COV-2 RNA/RVFFV IgM positive and one patient SARS-COV-2 IgA/IgM/IgG /WNV IgM positive. These two coinfecting patients also tested negative for malaria RDT.

The patient positive for both SARS-CoV-2 and RVFV is a 50-year-old male, living in Rosso-Senegal. He came in consultation at the health care of Rosso-Senegal sentinel site on July 28<sup>th</sup>, 2020, for an acute febrile syndrome without any history of travel. The recorded symptoms included an axillary temperature of 38.5°C, headache, myalgia, and arthralgia, anosmia and aguesia. The onset of symptoms was 3 days before the consultation date and the patient reported his participation to a burial in the last fourteen days before the onset of symptoms. Suspected for COVID-19 infection, a nasopharyngeal sample was collected the same day and tested positive for SARS-COV-2 by RT-PCR. In addition, the serological screening performed on the blood sample showed RVFV IgM (8). The patient recovered from the COVID-19 infection without complications.

The patient co-infected SARS-CoV-2/WNV, a 42-year-old male living also in Rosso-Senegal, was consulted at the same health care sentinel site for an acute febrile syndrome without any history of travel. The onset of symptoms was on July 23<sup>rd</sup>, 2020, including fever (temperature of 38.5°C), headache, myalgia, and arthralgia, asthenia and anosmia. The patient reported a regular exposure to a crowd in relation to his daily activity at the trading port of Rosso-Senegal. He was negative for SARS-COV-2 by RT-PCR while his blood sample was positive for both WNV (IgM) and SARS-COV-2 (IgA, IgM and IgG). The patient was finally recovered from the COVID-19 infection without complications.

From September 13<sup>th</sup> to October 1<sup>st</sup>, 2020, the ministry of health of the Republic of Mauritania has reported an outbreak of RVFV with 36 confirmed human cases and 13 deaths (CFR of 36,10%) in 11 regions and 42 positive in livestock animals. Three of these affected regions are on the border with Senegal [9]. Although the patient reported no travel outside of Senegal in the 4-months period before his illness, we believe that the patient was infected by contact with an animal imported from Mauritania through the cross-border pastoral movement of animals, given that no evidence of RVFV circulation among humans, animal and mosquitoes was reported in Senegal prior to this case. However, on October 15<sup>th</sup> and 23<sup>rd</sup>, 2020, one case of Roan antelope (*Hippotragus equinus*; Bovidae) and three human cases (PCR and IgM positive) were notified in Saint-Louis and Matam regions in Senegal, respectively [9], raising the possibility that the RVFV currently circulating in Northern Senegal could have originated from the Republic of Mauritania through the uncontrolled movements of animals in search of water and pasture.

WNV appears to be adapting to humans in West Africa, causing increasing numbers of febrile cases during the last 4 years [9, 10]. Multiple spillover of unrelated human cases has been reported this year in Senegal [9], raising concerns about the potential emergence of WNV strains with increased virulence. Given this continuing unpredictability and the rapid development of epidemics, timely surveillance for WNV infection including veterinary and entomological teams, need to be established in Senegal.

### 3. Conclusion

To date of our findings provide the first evidence of human SARS-COV-2 coinfection with arboviruses which occurred in Senegal and highlight the risk of misdiagnosis or

coinfection in regions where other widely prevalent infectious diseases were reported. Although, the COVID-19 is underway, there is crucial need to continue surveillance of other tropical diseases. In addition, clinicians should be aware of the possibility of coinfections in areas with overlapping outbreaks, and for the potential of a deleterious interplay between these viruses. More field studies on RVFV and WNV using “One Health” approach, are needed to evaluate their impact on public health. These data highlight the potential usefulness of differential diagnosis in an outbreak context and the advantages of using SARS-COV-2 RDTs since an overall rate of 26.31% of the RT-PCR negative patients (5/19) exhibited SARS-COV-2 antibodies.

### Conflicts of Interest

None declared.

### Author's Contributions

Designed the study: MF, CTD, MAB, AAS, OF; performed laboratory investigations: MF, CTD, MF, ON; revised the manuscript and accepted the last version: all authors.

### Funding

The study was supported by the Wellcome Trust and the UK Department for International Development (DFID) through the Joint Initiative on Research in Epidemic Preparedness and Response under the coronavirus grant (220764/Z/20/Z).

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