



SCRUB TYPHUS, DENGUE AND MALARIA IN THE YEAR OF COVID PANDEMIC

Microbiology

Dr. Rituparna Haldar*

Demonstrator, Department of Microbiology, Calcutta National Medical College.
*Corresponding Author.

Dr.Soma Bose

Assistant Professor, Dept. Of Microbiology, Calcutta National Medical College.

Dr. Mithun Bhakta

1st year PGT, Dept. Of Microbiology, Calcutta National Medical College.

Prof. Dr.Indrani Bhattacharyya

Professor, Dept. Of Microbiology, Calcutta National Medical College.

ABSTRACT

Introduction: 2020 is the era of Pandemic and there is a great spike of fever cases. While the number of Dengue and Malaria cases are reportedly fewer compared to 2019 but we have seen a rise in Chikungunya and Scrub typhus cases. As peak season of Scrub typhus, Dengue & Malaria overlaps, we have an inherent tendency to be biased towards Dengue & Malaria.

Methods: An observational study was conducted from January 2020 to December 2020, among febrile patients keeping the three major Vector borne diseases (Scrub typhus, Dengue & Malaria) in mind. They all turned out to be COVID negative. ELISA was the method of choice for detection of Scrub typhus antibody, Dengue NS1 antigen and Dengue IgM antibody whereas Blood Smear Microscopy along with Immunochromatographic method (RDT) were carried out for diagnosis of Malaria.

Results: Among 623 cases of Scrub typhus, 143 (22.4%) were positive, whereas 1080 cases were tested for Dengue NS1 and 78 (7.8%) turned out to be Positive, at the same time, 42 (4.2%) out of 990 cases were positive for Dengue IgM. A total number of 480 cases were tested for Malaria and 27 (5.6%) were positive.

Discussion and Conclusion: So in the era of COVID pandemic, where incidence of other vector borne diseases has decreased, for Scrub typhus, there seems to be resurgence. **Our goal was to conduct a study during this Pandemic to identify the three major Vector borne diseases (Scrub typhus, Dengue and Malaria) and also to compare their incidence with the previous NONCOVID year (2019). Although COVID is not a vector borne disease, the pandemic is having an all pervasive effect on the total human population.**

KEYWORDS

COVID pandemic, Scrub typhus, Dengue, Malaria, Chikungunya, ELISA

INTRODUCTION

India is a country where hot and humid conditions persist throughout the year and fever is a symptom frequently reported^[1]. Arthropod borne diseases such as Dengue, Malaria and Scrub typhus are significant etiologies of acute febrile illness^[2,3]. Scrub typhus, Dengue and Malaria are supposed to be prevalent from Monsoon, throughout the winter, from June to December. A little variation to this seasonal prevalence is seen in Scrub typhus. For the last two years, we have observed the persistent presence of Scrub typhus throughout the year. Scrub typhus is a disease caused by bacteria *Orientia tsutsugamushi*. It is carried by larva of mite called *Leptotrombidium*, also known as Chigger^[4]. It produces disseminated vasculitis, perivascular inflammatory lesions leading to vascular leakage and end organ failure. Preliminary diagnosis for Scrub typhus is made based on the physical examination and history of risk exposure. If children play in the garden, playground near shrubs they normally get bitten by chiggers. Clinical spectrum of Scrub typhus ranges from self limiting disease to multiorgan failure resulting in death. Patients present with fever, chills, headache, lymphadenopathy and rashes which can be deceptively like any viral infection. At the site of larval bite an Eschar develops but is reported to be found in variable proportion. In our institution we found many patients coming with fever and diarrhoea without any Eschar. Most patients recover with Doxycycline. Azithromycin is given in pregnant patients. If treatment is delayed, they may develop confusion, low platelet count and heavy rashes. People with severe illness may develop organ failure and bleeding which can be fatal.

Dengue is caused by a virus of Flaviviridae family. There are four distinct serotypes of the virus, DENV-1, DENV-2, DENV-3 and DENV-4. A fifth variant DENV-5 has been isolated in October 2013 but there is no indication of the presence of DENV-5 in India till now. It is a Mosquito borne illness, transmitted mainly by *Aedes aegypti* and to a lesser extent *Aedes albopictus*. Dengue is widespread throughout the tropics. Dengue causes a spectrum of diseases from subclinical infection to severe flu-like symptoms. Some even develop severe Dengue associated with grave complications like bleeding, plasma leakage and organ failure. People who have suffered from Dengue are at higher risk of developing severe Dengue or Dengue Shock Syndrome. Dengue fever is self limiting, close monitoring of the

patient^[5], antipyretics (paracetamol) and adequate hydration are needed but if symptoms of complications appear, hospitalization is needed.

Human Malaria is caused by one or more of five parasites: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*. *P. falciparum* is the species most commonly associated with fatal malaria. Malaria is transmitted by bite of an infected female *Anopheles stephensi*, or female *Anopheles culicifacies* mosquito. Other minor routes of transmission: Blood transfusion or transplant from infected mothers and rarely through liver transplant. Onset of illness is associated with the rupture of erythrocytic schizonts. Patients develop fever, chills, myalgia, arthralgia, headache, diarrhoea and other non specific signs. There may be splenomegaly, anaemia, thrombocytopenia, pulmonary or renal dysfunction, altered sensorium^[6]. *P. falciparum* is associated with most death cases as major part of erythrocytic schizogony occurs in capillaries of deeper organs and thus it affects the major organs like brain which are supplied by end arteries. Initially the patients were treated with Chloroquine and severe cases were institutionalized and treated accordingly.

METHODS

We conducted the study between January 2020 to December 2020 and the study was compared with the numerical data obtained between January 2019 to December 2019. Samples were collected from suspected patients having fever (reported to have fever for more than 48 hrs and body temperature was $\geq 37.5^{\circ}\text{C}$), headache, myalgia, cough, minor rashes (some of them reported to have typical black Eschar) and gastrointestinal symptoms. Diagnostic assays were carried out. These patients also went through COVID fever clinics and all were tested (RT-PCR) negative for SARS CoV2. For detection of Scrub typhus we used InBios Scrub typhus IgM ELISA kit which is a quantitative ELISA for the detection of IgM antibodies to *Orientia tsutsugamushi* (OT) in serum. For Dengue NS1 antigen detection we selected Bhat Bio-Scan ELISA kit & for IgM antibody detection we had InBios DENV Detect IgM capture ELISA kit. For detection of Malaria parasites we performed two methods simultaneously, first, MAL CARD J Mitra Rapid Malaria Card (Immunochromatographic method) and second Blood smear microscopy (Thick and thin smear)

RESULTS

Total 1080 samples were tested for Dengue NS1 ELISA out of which 78 (7.2%) were tested positive, and out of 990 samples for Dengue IgM ELISA, 42 (4.2%) were positive. For Malaria parasites, total 480 cases were tested, among them 27 (5.6%) were positive both by RDT and Microscopy. Total 623 cases were tested for Scrub typhus out of which 143 (22.4%) were positive.

BUT when we started to compare the above mentioned data of 2020 with previous year's data, the results were quite surprising. In 2019, total 1576 samples were tested for Dengue NS1 antigen, out of which 195 (12.37%) were positive and out of 1240 samples of Dengue IgM, 110 (8.87%) were positive. For Malaria parasites, total 756 samples tested and 79 (10.5%) were positive. For Scrub typhus, total 426 samples were tested and **89 (21%) were positive.**

DISCUSSION

Such comparative "incidence" studies among the three vector borne diseases habitually troubling mankind, particularly in the tropics, have been performed for years together. **Scrub typhus is probably one of the most underdiagnosed and underreported febrile illness requiring hospitalization**^[7]. However the year 2020 is a unique year for all residents of the planet earth because of the advent of SARS CoV2 Pandemic. Since even the oldest residents alive have not faced a Pandemic before, all its effects are unique. Thus, we found during the peak Dengue season when the hospital laboratory is flooded with samples waiting for Dengue ELISA test, this year the Dengue testing laboratory had a comparatively calm Dengue season. So also was the case with the Protozoology laboratory, fewer than normal blood samples were sent for Malaria testing. However, in case of Scrub typhus amazingly the number of samples had not dwindled. On the other hand the number had increased slightly along with the percentage of positivity.

Previous studies show varying results.

A study in Raurkella in 2019 showed a high incidence of Dengue ELISA as compared to Scrub typhus and Chikungunya^[8].

A study in 2018 in Kolkata, India, showed relatively higher incidence of Dengue ELISA as compared to Scrub typhus cases^[9].

Another study in 2019 in Karnataka, India, showed much higher incidence of Dengue cases as compared to Malaria and Scrub typhus^[10].

CONCLUSION

This study and a few others which be consulted have helped us to come to the conclusion that:

The trend in incidence in Scrub typhus has not been affected. In the prepandemic i.e 2019 we experienced the same trend in Scrub typhus incidence i.e more or less steady numbers all throughout the year. The picture remains identical in Pandemic year 2020.

During the peak Dengue season when the Dengue laboratory always has its handful, in this year of the Pandemic the number of samples tested has gone down drastically. So also the positivity.

Malaria also is showing the same picture as Dengue. Total case number and incidence have fallen drastically in the year of the Pandemic.

The causes of this changing trend may be many. However before analyzing them we should always keep in mind that any fever case should be investigated for the cause of fever till all available investigations have been done. Scrub typhus should form an important member of this list being no less important than Dengue, Malaria, Chikungunya and Corona.

REFERENCES

1. John TJ, Dandona L, Sharma VP, Kakkar M, Continuing challenge of infectious diseases in India. *Lancet*. 2011;377(9761):252-69
2. Annual report of hospital based surveillance of acute febrile illness in India in Manipal Centre for Virus Research; 2017
3. Robinson ML, Kadam D, Khades S, Balasubramanian U, Raichur P, Valvi C, Marbaniang I, Kanade S, Sachs J, Basavaraj A, et al. Vector-borne disease is a common cause of hospitalized febrile illness in India. *Am J Trop Med Hyg*. 2018;98(5):1526-33.
4. Walker DH. Scrub typhus- scientific neglect, ever-widening impact. *N Engl J Med*. 2016;375(10):913-5.
5. Dengue and severe Dengue. <http://www.who.int/news-room/fact-sheet/details/dengue-and-severe-dengue>. Accessed 23 June 2018.
6. World Malaria report 2017. <http://www.who.int/malaria/publications/world-malaria-report-2017/report/en/>.

7. Chunchunur sk. Scrub typhus in India – an impending threat ! *Ann Clin Immunol Microbiol*. 2018;1,(1):1003 tropical med 3010011
8. Rao et al. Dengue, Chikungunya and Scrub typhus are important etiologies of Non-malarial febrile illness. *BMC Infectious Diseases*. 2019; 572(19):4161-6.
9. Sanjit Patra, Debalina Das, Is Dengue Epidemic Masking The Incidence Of Scrub Typhus. *IOSR-JDMS*. 2018;17(3):2279-0853.
10. Kashinkunti Md, Gundikeri SK, Acute undifferentiated febrile illness- clinical spectrum and outcome from a tertiary care hospital of north Karnataka *Int Biol Med Res* 2013 4(2): 3399-402.