Co-infection with Malaria and Coronavirus Disease-2019

Sir,

Coronavirus disease-2019 (COVID-19), caused by severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), is an ongoing global pandemic. Among the plethora of knowledge being garnered about the virus, the occurrence of co-infections and superinfections is also being reported.\(^1\) Although SARS-CoV-2 is the first culprit to be suspected in symptomatic cases, it is important not to lose sight of the burden India faces with other infectious diseases. We report a case of malaria and COVID-19 co-infection.

A 67-year-old male, a known case of type 2 diabetes mellitus and heart disease, presented with complaints of fever and progressive exertional breathlessness for 4 days in the 1st week of May. He had no history of travel or contact with a COVID-19-confirmed case. On examination, his oxygen saturation was 96% on room air. Complete blood count revealed moderate thrombocytopenia of 71.0 × 10^9/L with normal hemoglobin and white blood cell counts. On peripheral blood examination, ring forms and trophozoites of *Plasmodium vivax* were seen, along with reactive lymphocytes.\(^1\) Chest X-ray (anteroposterior view) showed haziness in both lung fields. The patient was started on intravenous injection artesunate, followed by artemether and lumefantrine, per oral. He responded well to the antimalarial treatment with symptomatic relief.

Although his first nasopharyngeal swab for SARS-CoV-2 real-time reverse transcription–polymerase chain reaction test indicated the absence of the virus, repeat swabs sent on day 3 revealed positivity for the same. In the coming week, his platelet counts improved to normal levels, and he became clinically asymptomatic and stable.

Co-infections of COVID-19 are thought to be very common, as high as 80%, most commonly with seasonal respiratory pathogens.\(^1\) With overlapping symptoms and travel history (significant for COVID-19 and malaria), co-infection diagnosis may be challenging.

India witnesses a temporal rise in water-borne and water-related diseases, including malaria, in the monsoon season, annually. With the ongoing pandemic, one can expect an increase in the rate of co-infections with COVID-19. It is important to investigate thoroughly in order to correctly identify a treatable infection as well as the presence of co-infections. While many clinical trials are ongoing for COVID-19 with no approved treatment regimen yet, there are already established antimalarial, antiviral, and antibiotic schemes for known infections. At present, the entire population, globally, is at very high risk of COVID-19. In 2018, it was reported that nearly half of the world population was at risk of malaria.\(^2\) A single case of COVID-19 can potentially be infective to 3.58 susceptible individuals.\(^1\) Likewise, an untreated case of malaria can lead to community spread. Furthermore, due to lockdowns and restricted mobility, there have been interruptions to health-care access and national malarial control programs. The World Health Organization is urging countries to ensure the continuity of malaria services in the context of the COVID-19 pandemic.\(^4\) It is advisable that health-care professionals screen for malaria while they test for COVID-19.\(^5\) This would help in timely identification of two infectious diseases having significant global impacts and reduce unnecessary morbidity and mortality.

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**Conflicts of interest**

There are no conflicts of interest.

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Sir,

Shimla is an international tourist destination in the sub-Himalayan region of northern India. It was the summer capital of British India, and people visit here to have a glimpse of the heritage from that era. The 2017 figures show that Shimla sees a large influx of tourists both domestic (over 3.4 million/year) and foreign (0.16 million/year). [1]

According to a tourism survey by the Ministry of Tourism in Himachal Pradesh, the foreign tourists (0.16 million/year) visiting Shimla are from the United Kingdom (15%), the United States (9%), France (6%), the UAE (6%), Spain (5%), Germany (5%), Australia (5%), and Canada (5%). [1,2]

The rhesus macaque monkeys are a major attraction for the tourists visiting Shimla. Macaques move freely among the local crowd and attract the eyes of all tourists [Figure 1]. They are, however, quite aggressive when disturbed and bite anyone who messes with them. Every year, our hospital receives over 600 cases of macaque bites, 75% of which are of category III bites, and over 35% of these victims are tourists. [3]

Combining data from other hospitals in Shimla town, the total monkey bites every year are on average 1326 since 2014, an average of 3.6 macaque bites/day. [4]

Rabies has been established in dead macaques, and rabies prophylaxis is, therefore, recommended in all cases of macaque bites. [5]

Internationally, herpes B virus infection is another major concern after macaque bites. [6] The first case of fatal human infection with herpes B virus from a macaque exposure was reported in 1997 in a 22-year-old female worker at a primate center, who possibly acquired infection through a splash of fecal matter into her right eye. She got cured of herpes B virus infection after antivirals but developed post viral encephalitis and succumbed to this complication. [7]

After this incident, the center for disease control convened a working group in 1999 and issued guidelines for antiviral prophylaxis after macaque bite. [6]

Thereafter, the published literature expresses a great concern for herpes B virus infection and thus covers all macaque bites with antivirals such as acyclovir or ganciclovir. In our experience with over 8000 rhesus macaque bites since 2014, we have not encountered even a single case of herpes B virus infection after macaque bite. The World Health Organization also does not mention postexposure prophylaxis with antivirals after a macaque bite. [8]

In our hospital, we have also never used antivirals for postexposure prophylaxis.