



The emergence of yellow fever: outbreak, symptoms, transmission, prevention, treatment, and possible consequences

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Dear Editor,

Yellow fever is a serious condition caused by a virus carried by specific mosquito species. The majority of its distribution is in sub-Saharan Africa, South America, and the Caribbean. The sickness is extremely uncommon among travelers and is preventable with a vaccination. There were 12 instances of yellow fever cases were reported among European visitors between 1999 and 2018. Five of these cases occurred in 2018^[1], and none of the travelers had any vaccinations. According to the WHO, yellow fever affects 200 000 people worldwide annually and kills 30 000 people. Due to diminished local population immunity to infection, deforestation, climate change, and dense urbanization, yellow fever looks to be spreading globally^[2]. Currently, the yellow fever virus is in American countries and 34 African nations^[3]. There are two major clades that the yellow fever virus can be divided into. More specifically, the first clade consists of four genotypes, two of which were found in West^[4] Africa and two of which were found in South America. It has been hypothesized that this genetic separation between South American and African populations may have begun around 471 years ago. The consists of three genotypes known as the second clade were found in Central/East Africa^[5].

The first strain is considered to have originated in East Africa about 3400 years ago, deriving from a *Flavivirus* parent. Compared with the resemblance between the latter and the East African strains, a stronger similarity between American strains and West African strains has been reported^[6]. The earliest signs of yellow fever often appear 4–7 days after contracting the illness. They consist of vomiting, fever, nausea, headache, muscle or back discomfort, loss of appetite, and light sensitivity in your eyes. The likelihood of developing more severe symptoms, including jaundice, bleeding from the nose, mouth, ears, eyes, vomiting blood, or

passing blood in the feces, is as high as one in four^[7]. Three stages of yellow fever exists. Stage 1 (infection): Common symptoms include headache, aches in the muscles and joints, fever, flushing, jaundice, vomiting, and loss of appetite. After 4–5 days, symptoms often subside for a little period of time. Stage 2 (remission): Absence of fever and associated indications at this point, the majority of patients will improve, but others may deteriorate within a day. Stage 3 (intoxication): There may be problems with numerous organs, including the liver, kidney, and heart. In addition, delirium, coma, convulsions, and bleeding issues could happen^[8]. Yellow fever is not present in the Asia-Pacific area, while it was historically endemic to South America and sub-Saharan Africa. The anthropophilic *Aedes* mosquito, whose range spans a wide belt of tropical and subtropical countries, is the principal vector of the yellow fever virus. A new viral development is posing a threat to Asia due to rising exchanges between Africa and Asia that have resulted in imported yellow fever virus cases in nonendemic areas^[9].

Yellow fever is carried by mosquitoes of the *Aedes* and *Haemogogus* species, which are arboviruses of the *Flavivirus* genus. The many types of mosquito species live in a variety of habitats; some breed close to human settlements (domestic breeding), others in the jungle (wild breeding), and some do both (semidomestic). There are three different types of transmission cycles: (1) Sylvatic (or jungle) yellow fever: In tropical rainforests, wild mosquitoes of the *Aedes* and *Haemogogus* species bite monkeys, which act as the disease's primary reservoirs and disseminate the virus to other monkeys. Yellow fever can occasionally strike people who are traveling or working in the forest after being bitten by an infected mosquito. (2) Intermediate yellow fever: In this form of transmission, semidomestic mosquitoes, which may breed both in the wild and close to habitations, infect humans along with monkeys. Enhanced human–mosquito contact leads to greater transmission, and epidemics can happen at the same time in several villages throughout an area. This type of outbreak is the most prevalent in Africa. (3) Urban yellow fever: Due to lack of immunization or prior exposure to the disease, most people in these densely populated regions with a high *Aedes aegypti* mosquito population have little to no antibodies against the virus. In these circumstances, the virus is spread from person to person by infected mosquitoes^[3]. Get the yellow fever vaccine 3–4 weeks before your travel if you will be spending any time in a region where the disease is known to exist. A single dose usually offers lifetime protection. Other advice is: (1) Apply a DEET-containing insect repellent. (2) Put on long sleeves, long pants, and socks. Wearing clothing that has been treated to repel mosquitoes is recommended. (3) If the lodge does not have air conditioning or window screens, think about utilizing a bed net. (4) Avoid going outside when mosquitoes are out in force. However, one of the mosquitoes that transmit yellow fever eats throughout

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This manuscript has been peer reviewed.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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International Journal of Surgery (2023) 109:3213–3214

Received 22 October 2022; Accepted 16 November 2022

Published online 1 March 2023

http://dx.doi.org/10.1097/JS9.000000000000058

the day, so typically this implies sunset to morning. (5) Continue to cover up even after receiving a yellow fever diagnosis. A mosquito shouldn't bite you, then bite someone else^[10]. Yellow fever has no known cure, which is one of the reasons vaccinations and other preventative measures are so crucial. Supportive treatment, which includes rest, water, and the use of medications to assist decrease fever and discomfort, aims to control the symptoms. Avoid using aspirin, NSAIDs because they may make bleeding more likely. Yellow fever patients should be protected against additional mosquito exposure in the early days of their disease (e.g. by using a mosquito net) to prevent contributing to the disease transmission cycle^[11]. Yellow fever has no known treatment, but you can manage the symptoms while your body fights the virus. After 3 or 4 days, the majority of patients recover fully. However, up to 50% of people who have the most severe yellow fever symptoms will pass away. In the interim, pain relievers like ibuprofen or paracetamol can assist in reducing body temperature and ease any discomfort. In addition, hydrate yourself well to prevent dehydration. If your symptoms are more severe, you might need to check into a hospital where your condition will be closely monitored and treated until you feel better^[7].

There is no medication to prevent or treat yellow fever illness. To lower temperature and ease soreness, rest, hydrate, and take painkillers and medication. Avoid taking medicines which may increase the risk of bleeding such as NSAIDs, such as naproxen, and ibuprofen aspirin. Patients suffering from severe indications of a yellow fever infection should be brought to the hospital for intensive supervision and medical intervention. Take precautions against mosquito bites for a minimum of 5 days which typically appear around 7 days after an infected insect bite. This will lessen the risk of yellow fever spreading to mosquitoes that can infect other people with the virus^[3]. Shock, disseminated intravascular coagulation, coma, death, kidney failure, parotitis, secondary bacterial infections, liver infection are complications that could happen^[8].

Ethical approval

None.

Sources of funding

None.

Author contribution

M.R.I.: conceptualization and writing – original draft preparation. P.S.D.: writing and editing. M.M.R.: editing and

supervision. All authors have reviewed and approved the final version of the manuscript before submission.

Conflicts of interest disclosure

The authors declare that they have no financial conflict of interest with regard to the content of this report.

Research registration unique identifying number (UIN)

None.

Guarantor

Md. Mominur Rahman.

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