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Evaluation of Malaria Control and Prevention of Malaria Elimination

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Abstract

Malaria is one of the leading causes of death worldwide. According to the World Health Organization's (WHO's) world malaria report for 2018, there were 228 million cases and 405,000 deaths worldwide.Background The efficient allocation of financial resources for malaria control using appropriate combinations of interventions requires accurate information on the geographic distribution of malaria risk. An evidence-based description of the global range of Plasmodium falciparum malaria and its endemicity has not been assembled in almost 40 y. This paper aims to define the global geographic distribution of P. falciparum malaria in 2007 and to provide a preliminary description of its transmission intensity within this range. Methods and Findings The global spatial distribution of P. falciparum malaria was generated using nationally reported case-incidence data, medical intelligence, and biological rules of transmission exclusion, using temperature and aridity limits informed by the bionomics of dominant Anopheles vector species.

Keywords: Malaria diagnosis • Microscopy • PCR-Polymerase chain reaction test • RDT-Rapid diagnostic test

Introduction

For centuries, humans have been plagued with malaria, a disease that seems to prevail over strategies used to combat it. It is becoming more challenging through the emergence of antimalarial drug resistance. The female Anopheles mosquito serves as a competent vector to transmit the Plasmodium parasite to human hosts with each blood meal. The mosquito remains unharmed by the parasite, and its ubiquitous nature ensures the transmissibility of the disease. According to the World Health Organization (WHO), there were 228 million cases and 405,000 deaths worldwide in 2018. The countries where the disease is endemic are referred to as the "malaria belt"

Malaria is a febrile illness and clinical symptoms of uncomplicated malaria include fatigue, headaches, muscle aches, malaise, abdominal discomfort, fever, nausea and vomiting. Specific diagnostic methods are needed to differentiate between malaria and other febrile illnesses. The early diagnosis of malaria can prevent further progression and lower the severity of the disease.

A laboratory-confirmed case is defined as a case with: malaria parasites confirmed by microscopy, a positive rapid diagnostic test (RDT), a positive polymerase chain reaction test (PCR), or a case presentation with or without typical malaria symptoms. All other cases with malaria-like symptoms and a history of travel to a malaria endemic area during malaria transmission season, or a history of blood transfusion in past 2 weeks, but without positive laboratory test results, were classified as suspected or probable cases. Both of these kinds of cases were regarded as non-laboratory confirmed malaria cases in this study.

Microscopy

The microscopic examination of thick and thin blood films is a "gold standard" test that is used to detect parasitemia in the blood and guiding appropriate treatment. A drop of blood is collected from a patient via a finger stick or venepuncture. When a venepuncture is used for blood collection, it is suggested that the blood is spread onto a slide immediately after collection to prevent prolonged exposure to anticoagulants in the collection tube that may alter parasite morphology.

Conclusions

Although current diagnostic methods in use are not all perfect, they continue to play important roles in dealing with the current global malaria situation and to decrease the incidence of malaria. Numerous innovations continue in developing additional invasive as well as non-invasive and specific methods. Diagnostic tools are critical in ensuring that each patient receives the appropriate care. Currently-used methods such as microscopy, RDTs and PCR are not being utilized to their full capacity due to several barriers and limitations, such as cost, trained personnel, access to equipment, and unreliable electricity.

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