MINI REVIEW

Human mobility's effect on the outbreak of dengue and malaria epidemics

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ABSTRACT

The *Aedes* mosquito genus spreads the globally significant arboviral infection. More than 120 nations have endemic populations of this species, primarily in Southeast Asia, the Western Pacific, the Caribbean, Latin America, various US states, Africa, and the Middle East. Marked thrombocytopenia, severe hemorrhage, plasma leakage leading to shock or fluid accumulation with respiratory difficulty, and severe organ dysfunction are the hallmarks of severe dengue fever. Serology and viral antigen or nucleic acid detection are examples of confirmatory assays. Clinically difficult to differentiate from illnesses caused by the Zika and chikungunya viruses without diagnostic testing. The first vaccine to be licensed globally for the prevention of dengue is a tetravalent vaccination that has been approved in Mexico. Malaria is a major global source of mortality and morbidity that is brought on by protozoan parasites of the genus *Plasmodium*. These parasites have a convoluted life cycle in both their vertebrate hosts and mosquito vectors. The emergence of drug-resistant parasite strains, the expansion of insecticide-resistant mosquito strains, and the absence of licensed malaria vaccines with established efficacy are the main causes of malaria's return.

Key Words: *Malaria, Dengue, Humans*

INTRODUCTION

Plasmodium parasites are protozoan parasites that cause malaria, sometimes known as the "King of Diseases." *Plasmodium falciparum* is the parasite that causes malaria, which is often fatal. Although *P. knowlesi, P. vivax, P. ovale, P. malariae,* and occasionally P. *malariae* can cause acute, severe sickness, their fatality rates are minimal. More than 40% of the world's population is at risk of malaria in more than 100 different nations, making it the most common infectious illness in tropical and subtropical areas and a significant global health issue. In sub-Saharan Africa, malaria is thought to affect approximately 500 million people annually and kill between 1 million-2 million people, 90% of whom are children. Since an accurate diagnosis lowers both malaria complications and mortality, the need for practical and effective diagnostics is growing. Based on patient's signs and symptoms or medical professionals' findings, it could be challenging to distinguish a clinical diagnosis from other tropical infections. Therefore, the requirement for confirmation diagnosis employing laboratory methods is critical.

The current diagnostic options for malaria in various settings are discussed in this review, along with an evaluation of their viability in both resource-rich and resource-poor environments [1]. Permanent and irreversible scarring and fibrosis result from the catheter's frequent intimal stress against the vascular wall, episodes of line CRBSIs, and thrombosis. Patients gradually experience central venous stenosis and occlusions, which make placing further access points more difficult. It is also common to try less ideal locations, like the lumbar or groyne veins, although these pose a higher risk of thrombosis and infection. End-Stage Vascular Access develops as a result of a vicious cycle that consumes venous space. This provides significant hazards to IF patients when combined with recurrent CRBSIs, which may be a reason for intestinal transplantation. In patients with catheter-related difficulties, several alternate delivery methods have been used. One of these options is the development of peripheral limb Arteriovenous Fistulas (AVFs), which provide IF patients with a peripheral access option and are primarily employed in patients with end-stage renal failure for dialysis access. However, while displaying reduced infection rates and higher delivery flow rates

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(shortening TPN delivery times), success has been hindered by subpar access patency rates [2].

A female *Anopheles* mosquito that has contracted malaria will bite you. Out of the 400 species of Anopheles in the world, about 60 naturally transmit malaria, with 30 of these species being of significant relevance. Eukaryotic single-celled microorganisms of the genus *Plasmodium* are malaria parasites. Only four parasite species may infect people naturally: *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale*, and *Plasmodium malariae*. More than 100 *Plasmodium* species can infect a wide range of animal species, including reptiles, birds, and other mammals. These four species differ from one another in terms of morphology, immunology, geographic distribution, relapse patterns, and treatment responses. *P. falciparum* is the primary cause of malaria mortality and the agent of severe, potentially deadly malaria. The parasitic life cycle of malaria requires the expression of specific proteins in both invertebrate and vertebrate hosts for the parasites to survive. These proteins are necessary for the survival of both intracellular and extracellular organisms, as well as for the invasion of various cell types and the evasion of host immune responses. *P. falciparum* and *P. malariae* sporozoites cause instant schizogony once they are injected into the human host, but *P. ovale* and *P. vivax* sporozoites can either cause immediate schizogony or delayed schizogony as they progress through the hypnozoite stage [3].

There are two types: traditional Dengue Fever (DF), which is spread to humans by the *Aedes* mosquito, and Dengue Hemorrhagic Fever (DHF), which has the potential to progress to a severe form known as Dengue Shock Syndrome (DSS). The primary issue with dengue is that there are four different serotypes known as *DEN1, DEN2, DEN3, and DEN4* that cause the illness. Once exposed to one of the four serotypes, a person will never be susceptible to that serotype again (homologous immunity), but after about 12 weeks, he or she loses immunity to the other three serotypes (heterologous immunity), making them more vulnerable to dengue hemorrhagic fever. The first form (DF) is characterized by a sudden fever without respiratory symptoms, accompanied by intense headaches making its nickname "breakbone fever" well deserved. It lasts between three and seven days but it stays benign. The Hemorrhagic Form (DHF) is also characterized by a sudden fever, nausea, vomiting, and fainting due to low blood pressure caused by fluid leakage. It usually lasts between two days and three days and can lead to death. The case of a second infection has therefore capital importance because of the possibility of evolution toward the hemorrhagic form of the disease [4].

For medical professionals inexperienced with the illness, diagnosis might be challenging in areas where malaria is no longer an endemic disease. Clinicians may neglect to request the essential diagnostic tests for some patients and fail to consider malaria as a possible diagnosis. If technicians examine blood smears under a microscope, they might not recognize parasites because they are ignorant of or inexperienced with malaria. In some places, such as Africa, malaria transmission is so severe that a significant portion of the population is sick but shows no symptoms. These carriers have enough protection to shield them from infection but not against malarial sickness. In such cases, the presence of malaria parasites in a sick person does not imply that the illness is a direct result of the parasites. In many nations where malaria is common, the absence of resources is a significant impediment to accurate and prompt diagnosis. Health professionals are underpaid, ill-equipped, and poorly trained. They frequently deal with an enormous number of patients and must divide their time between treating malaria and other infectious diseases that are just as serious, including tuberculosis or HIV/AIDS [5].

The infectious rate among those who are vulnerable to dengue fever is typically between 40% and 50% during epidemics, but it can reach 80% to 90% under ideal geographic and environmental circumstance s. More than 500,000 dengue hemorrhagic cases necessitate hospitalization each year. Dengue is a viral illness brought on by contact between susceptible people and any of the four serotypes of mosquitoes in the genus Aedes, as opposed to malaria, which is a parasite that primarily affects rural regions and is only spread via mosquito bites at night. Aedes aegypti and Aedes albopictus are the two species of vectors known to transmit dengue. The former is more anthropophilic than the latter and lives in rural regions. It thrives in big cities and bites mostly during the day. In light of this, dengue is crucial in two ways: Even in the absence of deadly forms, the disease generates enormous economic and social consequences due to its widespread distribution and numerous serotypes (absenteeism, immobilization debilitation, medication). The possibility of evolution's risk toward the hemorrhagic form of the disease and the dengue shock syndrome, both of which have substantial financial implications and can be fatal [6].

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