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Dengue-Associated Myocarditis: Clinical Spectrum, Pathogenesis, and Implications for Shock and Mortality

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Dear Editor

Dengue fever is one of the most common mosquito-borne viral infections of the tropical or subtropical areas with frequent outbreaks resulting in high mortality rates globally [1]. The well-known symptoms of dengue fever include fever, myalgias, headache, and thrombocytopenia, whereas its significant participation in myocardial infection is still underestimated. Substantial evidences suggest key role of myocarditis in driving dengue shock syndrome leading to hospitalization and death [2].

A recent study reported pooled prevalence of myocarditis in around 21% of dengue confirmed patients using systematic diagnostic criteria, which suggests significant association of dengue disease with cardiac complications [3]. In another study, myocarditis was found in approximately 4.2% of hospitalized dengue patients particularly in cohorts from low- and middle-income clinical settings. Among the dengue confirmed patients who had myocarditis developed cardiogenic shock, 21.4% more in-hospital mortality rate was recorded in patients with cardiac complications as compared to patients with a healthy heart [4].

Dengue myocarditis is based on several factors for its pathophysiology [5]. Direct viral-based myocardial injury and immune-mediated inflammation play a major role in cellular dysfunction in the myocardium [6]. Proinflammatory cytokines and endothelial dysfunction also increase capillary leakage in the peripheral tissues, and in the myocardium, exacerbating cardiac performance resulting in depressed left ventricular activity, diastolic dysfunction, and arrhythmias [7]. Clinical manifestations of dengue myocarditis ranges from mild subclinical disease to heart failure [8]. Mild electrocardiographic disturbances or abnormal increase in cardiac biomarker have also been reported in many patients [9]. However, in more severe cases, dyspnea, palpitations, hypotension and shock may occur resulting in hemodynamic fluctuations similar to plasma leakage- a characteristic feature of severe dengue. Such cases are documented to develop severe arrhythmias, cardiogenic shock, and even death, mostly in case of delayed diagnosis [10].

Dengue-related myocarditis presents a great challenge in its diagnosis either due to a high proportion of subclinical cases or due to the clinical manifestations such as tachycardia, hypotension, and fluid movements, which are often misleading and suggest dengue onset [11]. Echocardiographic structural assessment alone is insufficient and must be combined with the biomarker levels, and imaging to get a discerning diagnosis. Myocarditis, in case of dengue, has significant prognostic implications and patients suffering from myocarditis usually have prolonged hospital stays, need long-term supportive care, and have higher death rates [12]. Even though cardiogenic shock is not as frequent as hypovolemic shock caused by plasma leakage, it is a fatal complication that must be addressed with standard management measures [13]. Dengue myocarditis is one of the blind spots in clinical research, despite the increasing evidence particularly in resource-limited countries where dengue cases are alarming [14].

Early diagnosis of cardiac dysfunction results in timely surveillance using ECG, biomarkers and echocardiography, guiding more specific hemodynamic therapy and lowering the overall death rate. The outcomes could be further improved by increasing awareness of the clinicians and the routine cardiac examination of moderate to severe dengue patients. Dengue myocarditis is a significant yet an

overlooked heinous cause of shock and death; its real burden is likely to be under-reported due to the challenges of its diagnosis and similarity to the traditional dengue pathophysiology. Better clinical vigilance, rigorous examination of the heart in patients at high risk and more research about the customized management is urgently required. These practices can be used to address current gaps in care and coping with this uncharacteristic health complication.

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Authors' Contribution

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