

**Commentary**

Co-prevalence of COVID-19 and Dengue fever in Pakistan

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Pakistan is facing an epidemic of dengue fever amidst the COVID-19 outbreak, a serious public health concern. This article provides an overview of factors that could have led to an unexpectedly higher number of Dengue fever cases in Pakistan this year, such as insufficient preventive measures to control Dengue at the national and domestic level, lack of surveillance system for the spread and control of the disease, and the lack of awareness among the general population regarding the possible outbreak of the disease. This situation has challenged the overburdened healthcare system of the developing country, which was still recovering from the immense pressure of COVID-19. This study also highlights the challenges faced by physicians regarding the diagnosis and treatment of patients who are coinfecting with COVID-19 and Dengue fever. Early detection and accurate diagnosis are crucial for the management of patients with either of the disease. Authors have suggested a few measures that may help in improving the management and prognosis of patients coinfecting with COVID-19 and Dengue fever. Additionally, we have also proposed a few strategies, that, if adopted at the national level may help in controlling the spread of Dengue fever in the future. For example, policies should be devised by the government for the implementation of preventive measures at the domestic level which was in practice before the outbreak of COVID-19. Dengue fever is endemic in Pakistan since 2010 [1]. Pakistan is facing an outbreak of dengue fever this year and according to the National Institute of Health, Islamabad, Pakistan, the number of dengue cases has increased to 25,478 until 27th October 2021 [2]. Cities that are hard-hit by this disease include Lahore, Rawalpindi, Islamabad, and Khyber Pakhtunkhwa (KPK) [3]. A red alert has been issued for Dengue fever by the Ministry of National Health Services, Regulations and Coordination, Government of Pakistan [4].

According to the World Health Organization (WHO), over 249 million confirmed cases of COVID-19 and over 5 million COVID-19 deaths have been reported globally until 7th November 2021 [5]. Pakistan reported 1.28 million COVID-19 cases and 28,618 death through 16th November 2021 [6]. Despite multiple measures that are initiated by the Government of Pakistan to encourage people for COVID-19 vaccination, only 21.5% of the population is fully vaccinated as of 15th November 2021 [7]. COVID-19 and Dengue fever co-epidemic have further challenged Pakistan's weakened healthcare system. Hospitals are running out of beds and people are struggling to get medical aid. This could have a devastating effect on the affected population if enough measures are not taken to prevent, detect, and treat Dengue fever cases.

A number of reasons could have led to an unexpectedly higher number of Dengue fever cases in Pakistan this year: (1) Although, WHO warned dengue-endemic countries such as Pakistan about healthcare crisis that they might face in the era of COVID-19 [1], it seems that preventive measures regarding the possible outbreak of dengue fever were insufficient as the main focus of the majority of government campaigns was the prevention of COVID-19, (2) According to a report by the Ministry of Planning Development and Special Initiative, Government of Pakistan, the lock down measures during COVID-19 has reduced the employment percentage of Pakistani population from 35% to 22% (i.e. 55.74 million to 35.04 million people) [8], therefore, it is possible, that comparatively a smaller number of people are seeking medical care at an earlier stage of dengue fever due to the financial constraints, (3) Another reasons that may have prevented symptomatic Dengue fever patients for visiting hospitals at an early stage of the disease is the fear of contracting COVID-19 from hospitals, and lack of surveillance system for the spread and control of dengue might have affected a large number of people.

Dengue fever and COVID-19 share several similar clinical features which make it challenging to diagnose and treat patients coinfecting with these diseases. Patients with both diseases may remain asymptomatic or present with nausea, vomiting, high-grade fever, headache, muscular pain, confusion, and cough [9,10]. Both belong to families of RNA viruses [11,12]. Lymphopenia and skin rash is another common finding in both diseases [12,13]. Patients with Dengue fever and COVID-19 coinfection have been reported across different dengue-endemic countries [13,14,15]. Due to the similar clinical manifestation, chances of misdiagnosis of these patients are higher which may lead to delayed patient management and poor prognosis. Interestingly, studies have also reported possible cross-reactivity between SARS-COV-2 and dengue virus antibodies, further adding to the chances of false-positive results for both of the diseases [16,17]. A recent study from Pakistan reports high mortality in patients coinfecting with COVID-19 and Dengue fever than COVID-19 alone [14]. Early detection and accurate diagnosis are crucial for the management of patients with either of the disease.

We suggest several measures that may help to fight this co-epidemic situation at the national level: a) Public awareness campaigns should be launched about the importance of preventive measures, such as, clearing all sources of clean water or covering them, use of mosquito repellents creams, wearing protective clothing and maintaining hygiene as breeding places for dengue are flourishing this season, (b) Implementation of preventive measures at domestic level must be assured by the Government of Pakistan. This can be achieved through random checks of homes by government officials which was in practice before the outbreak of COVID-19. A system should be established for giving warnings or imposing fines to those houses that ignore the Government of Pakistan guidelines for the prevention of Dengue, (c) At the clinical level, a high suspicion should be considered for dengue fever infection even in patients with COVID-19, as treatment measures are different in the both comorbidities, (d) There is an urgent need to develop clinical guidelines and protocols to treat patients coinfecting with dengue and COVID-19, (e) Every year a warning system should be created regarding the possible outbreak of dengue through phone alerts, news channels, poster and announcement at public places to prevent the spread of these pathogens. Dengue control teams should be created in advance to take timely measures and control this endemic, (f) Dengue diagnostic tests should be made free of cost, and a home collection service for dengue blood tests should be initiated. Moreover, the government has established a field hospital for the treatment of Dengue fever patients at Expo Center Lahore, such facilities should also be created in other cities that have reported a higher number of dengue cases.

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