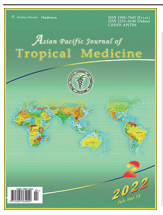

Perspective

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The outbreak of dengue during the COVID-19 pandemic in Pakistan: The emergence of overlapping crises

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COVID-19 pandemic has become a serious public health crisis for developed and developing countries around the world. As of February 17, 2022, over 420 million cases including 5.8 million deaths have been reported across the globe[1].

The first case of COVID-19 in Pakistan was detected on February 26, 2020; since then, the toll of confirmed COVID-19 cases reached 1 491 423 including 29 877 deaths as of February 17, 2022[1].

During the COVID-19 pandemic, dengue cases have increased in most of the dengue-endemic countries in the world including Brazil, Argentina, Colombia, Mexico, the Philippines, Malaysia, Singapore, Vietnam, Thailand, Indonesia, India, Bangladesh, Nepal, and Pakistan[2]. Over the last two decades, the number of dengue cases has increased over 8 folds from half a million in 2000 to 4.2 millions in 2019[3].

Unfortunately, dengue is a major public health problem in Pakistan, and it is likely to become an even greater problem in 2021 due to the COVID-19 pandemic. Pakistan represents the highest-burden of dengue in the Eastern Mediterranean Region (EMRO) since 2006[4]. According to the Ministry of National Health Services, Regulations, and Coordination, 146 891 laboratory-confirmed cases including 859 related deaths have been reported across the country since 1994[5]. The results of a recent published study showed that the dengue cases in Pakistan increased over 16-fold from 3 204 cases in 2018 to 52 485 cases in 2019[6]. Pakistan has been fighting against COVID-19 along with other 221 countries since February 2020[7] and simultaneously putting efforts to combat emerging dengue transmission as more than 10 392 dengue cases have been reported during September and October 2021 in the country. Many (n=4 900, n=2 192, and n=3 300) confirmed dengue cases including 10 deaths have been reported from Punjab, Sindh, and Khyber-Pakhtunkhwa (KPK) province of Pakistan, respectively (NIH unpublished data). It is speculated that the actual number of dengue cases may be higher than reported as most of the dengue infected patients remain asymptomatic and silently transmit the virus in the community. More than 90% of confirmed dengue cases were reported from Karachi, Lahore, and Peshawar city which are considered as major hotspots for dengue outbreaks since 2005. According to the epidemiological pattern of dengue in Pakistan, dengue outbreaks occurred after one year with a gradual increase in the incidence and geographic expansion. On the other hand, the climate of the country is characterized by high temperature and humid conditions, making it a favorable environment for vector breeding. As a result of climatic conditions, overcrowded population, and lack of proper vector control measures, the country recorded the highest incidence of dengue in five explosive epidemics in 2011, 2013, 2015, 2017, and 2019[5]. Details of dengue outbreaks reported in Pakistan between 2011 and 2021 are presented in Figure 1. According to the history of dengue epidemics in Pakistan, 2021 is considered as the dengue outbreak year and the intensity of this outbreak will be devastating as this outbreak started in the presence of the COVID-19 pandemic which has disrupted all preventive activities against other infectious diseases including immunization and vector control measures. The breeding of dengue vector stops once the environmental temperature falls below 16 ℃ and unfortunately, it is predicted by the Metrology Department of

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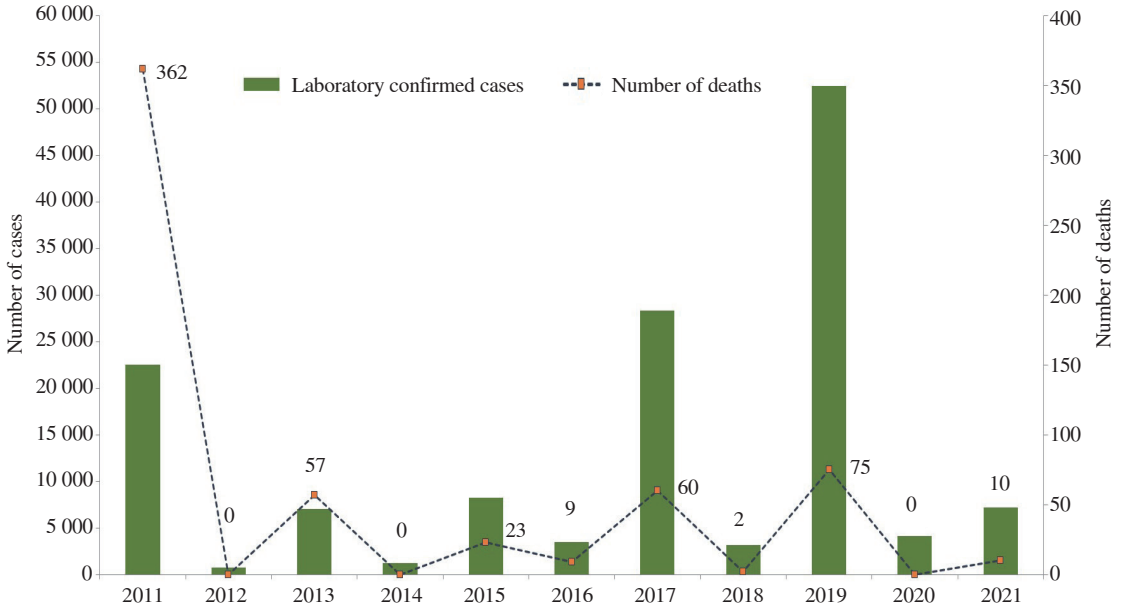

Figure 1. Reported dengue cases and deaths in Pakistan between January 2011 and October 2021 (NIH unpublished data)[5].

Pakistan, due to the global warming the temperature and humidity in Pakistan will remain 26 ℃-29 ℃ and 60% up to December, 2021, providing the favorable conditions for vector breeding[8]. The emergence of dengue during the COVID-19 pandemic creates multiple challenges for healthcare professionals because it is highly difficult to distinguish COVID-19 and dengue infection due to similar clinical and laboratory characteristics, mimicking each other[9]. The overlapping clinical presentation of both viruses leads to serious consequences for the poor healthcare system in the dengue-endemic countries including Pakistan. During the pandemic period, as the maximum resources such as hospitals, diagnostics laboratories, surveillance staff, vector control teams, are diverted to contain the COVID-19, there is a major setback for controlling other diseases including dengue. The co-existence of COVID-19 and dengue in endemic countries[10] including Pakistan creates an alarming situation concerning accurate diagnosis, prevention, and treatment. The delay in prompt and accurate diagnosis can lead to high morbidity and mortality. Misdiagnosis of dengue and COVID-19, with failure to isolate the patients' results in a delay in the treatment of infection and enhances further spread of the viruses. The combination of dengue and COVID-19 is assumed as dangerous for the patients and healthcare system as well. The co-infection of COVID-19 and dengue have already been reported from dengue-endemic countries including India, Thailand, Bangladesh, Brazil, Singapore and Pakistan[11]. The ill-equipped healthcare system of Pakistan will not be able to withstand an influx of thousands of co-infected patients. To tackle the situation of misdiagnosis due to the overlapping clinical presentation, it is recommended that health authorities should immediately implement the protocol of differential diagnosis for both COVID-19 and dengue in every diagnostic laboratory in dengue hyper-endemic areas. For the dengue-endemic countries, the differential and timely diagnosis will help to control the disease and its worsening condition such as dengue hemorrhagic fever and dengue shock syndrome. The upsurge of dengue during the COVID-19 pandemic due to the disruption in surveillance and vector control gave rise to a more severe situation for the healthcare system of Pakistan than the COVID-19 pandemic alone.

In the light of the current co-epidemic scenario, Pakistan's poorly funded healthcare system will collapse and pose a serious threat to socio-economic stability. Vector control measures using insecticides are considered as a frontline measure for preventing dengue infections; however, the effectiveness turns negligible once dengue cases have already been detected. The active monitoring of insecticides resistance to vector mosquitoes is of utmost importance.

The overlapping crisis of COVID-19 and dengue represents not only a challenge but also an opportunity to build a robust response strategy toward the prevention and control of infectious diseases having epidemic potential. We urge the government and health authorities to urgently develop proactive policies with innovative strategies for controlling dengue in the era of COVID-19 pandemics such as allocation of adequate resources, public awareness campaigns, vector control measures, active surveillance, availability of diagnostic kits, training of technical staff, developing the hand sanitizers by combining the insect repellent which protects from both COVID-19 and dengue.

Conflict of interest statement

The authors declare no competing interests.

Authors' contributions

MSR, AK, MU, MMA, MS, RF and MU supervised and were involved in study conception and design, data collection, analysis and interpretation, writing manuscript, and critical revision. MSR, MU and AK contributed to reviewing the manuscript, verified the critical revision for intellectual content, and finally approved the version to be published.

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