

Monsoon, Vitamin D, COVID-19 : Implications for India

Letter to the Editor / View Point

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1 Introduction

COVID-19, caused by SARS-CoV-2 virus has caused 11,903 deaths in India as of 17 June 2020¹. Epidemiological evidence shows that transmission and peaks of infectious diseases are associated with the timing and severity of monsoon, generally peaking towards the end of the monsoon period^{2,3}. Observational studies indicate that vitamin D deficiency might be a risk factor for severity and mortality of COVID-19⁴⁻⁶. This letter reviews the public health consequences in India due to COVID-19 during monsoon, keeping into account emerging evidence of the possible role of vitamin D in COVID-19 severity, lifting of the lockdown and the pressure on the healthcare system due to other infectious diseases during monsoon.

2 Potential Impact of Monsoon on SARS-CoV-2 Transmission & Immunity

Studies indicate that even in a sunnier country like India, vitamin D deficiency prevails in epidemic proportions due to reduced exposure of skin, dietary habits such as vegetarianism as well as limited fortification of food⁷. Skin synthesis via exposure to solar Ultraviolet-B (UVB) radiation is considered as the significant source of vitamin D as dietary intake is generally insufficient⁸. Government of India initiated a lockdown limiting the movement of 1.3 billion people from 24 March 2020 until 31 May 2020 in 4 phases (58 days) and has gradually started lifting the lockdown in a phased manner from 01 June, though COVID-19 deaths are increasing⁹. Lockdown, although helped in reducing the transmission of SARS-CoV-2, might have led to limited sun exposure leading to an increased likelihood of vitamin D deficiency in the general population.

Furthermore, the lifting of lockdown coincides with the onset of the monsoon, when the likelihood of UVB Radiation exposure is limited primarily due to lower sunshine hours, thick cloud cover and limited outdoor activities. Lifting of lockdown during monsoon may

also lead to an increased viral transmission as people are more likely to stay indoors with lower ventilation as evidenced by the surge in the COVID-19 deaths⁹.

3 Other Impact of Monsoon on Healthcare System

Prior studies indicate that influenza tends to peak during the monsoon months, i.e., July-September in significant parts of India coinciding with the timing of monsoon period¹⁰. Heavy rainfall and flooding, which is prevalent in monsoon, can create conditions conducive for other infectious disease outbreaks such as – dengue, malaria, influenza, diarrhoea, cholera and other respiratory diseases¹¹. Simultaneous contraction of COVID-19 and these infectious diseases prevalent during monsoon may also lead to poor clinical outcomes for COVID-19 patients.

Cities like Mumbai is prone to yearly monsoon flooding, causing disruptions in traffic - severely limiting the transportation of patients needing critical care to the hospitals. Furthermore, the sudden increase of such infectious diseases during monsoon is also likely to cause strain in the healthcare system, limiting the hospital capacity available for COVID-19 patients and vice versa. Heavy rainfall may also limit the governmental response to set up additional critical care capacity. These factors may further limit the healthcare system's ability to provide critical care to COVID-19 patients.

4 Need for Measures in India

Healthcare providers should expect an increase in cases of COVID-19 as well as other infectious diseases and prepare for an increase in hospital capacity. Further, healthcare practitioners might need to consider factors such as diet, sunlight exposure and consider administering vitamin D supplementation to correct any vitamin D deficiency.

The increased possibility of COVID-19 transmission, potential vitamin D deficiency and the increased pressure on the healthcare systems due to other infectious diseases may lead to

an increased mortality rate from COVID-19 in India during monsoon. Establishing the efficacy of vitamin D supplementation/sunlight exposure would be a significant advance in the control of COVID-19 pandemic in India during monsoon. This topic in India needs urgent attention from medical researchers around the world. Additionally, government and healthcare providers need to urgently plan to mitigate the impact of COVID-19 on public health by addressing these topics as early as possible.

5 Declaration of Interests

RKM is a PhD researcher at Goethe University, Frankfurt. He also is an employee of a multinational chemical company involved in vitamin D business and holds the shares of the company. This study is intended to contribute to the ongoing COVID-19 crisis and is not sponsored by his company. All other authors declare no competing interests. The views expressed in the paper are those of the authors and do not represent that of any organization. No other relationships or activities that could appear to have influenced the submitted work.

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7 Author Contributions

RKM conceptualized the research idea & conducted literature research. PK reviewed and edited the article.

8 Role of the Funding Source

This study is not sponsored by any organization. The corresponding author had full access to all the data and had final responsibility for the submission decision.

9 Additional Information

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