

COVID 19 THIRD WAVE IN INDIA : A REVIEW

Arathi Menon P¹, Sahana S², Shiva Kumar GC³, Hari R⁴, Shivanad B Bagewadi⁵

ABSTRACT :

The nov-CoV-19 commonly known as COVID-19 reported first in Wuhan Province of China during late 2019 initiated as a common flu, escalated its spread across the Globe in no time. The WHO declared SARS-CoV- 2 as a pandemic and it affected every countries with high fatality and mortality rates. India witnessed a highly fatal first and second wave affecting millions of people. Wavering off the restrictions and attitude of the public determines the incidence and severity of a COVID-19 third wave in India. This paper reviews the prediction model analysis used to predict the third wave estimated using epidemiological data from the first and second wave of COVID-19. With complete preparedness and precautionary measures the impact could be limited. This review also analyses the potential barriers and overcoming them in tackling the third wave.

KEYWORDS: COVID 19, SARS-CoV-2, Third wave, pandemic, Corona virus.

INTRODUCTION :

During December 2019, an unknown origin flu presented in Wuhan Province of China, with clinical symptoms of fever and dyspnea in few persons which spreads rapidly alerted the health workers of an upcoming pandemic. The organism responsible was identified to be SARS-CoV- 2, a novel Beta Coronavirus on 9 January 2020.¹ Within days of the initial infection, the virus showed a high rate of infectivity and mortality. Most of the fatalities presented with underlying systemic conditions or with compromising health.

High transmissibility of the virus is through respiratory droplets from one person to other as well as through direct contact and fomites.³ After the entry of SARS Cov-2 into the human body, evidences suggests that incubation period ranging from 1-14 days for presenting symptoms. Another factor responsible for transmissibility is the basic reproduction number (R0). nov- CoV-2 have a higher transmissibility compared to SARS-CoV and Mers CoV.² Estimates by J Read. et al. suggests R0 of nov-

CoV-2 to be 3.6-4.0 which indicates that prevention of 70-75% of infection transmission could reduce the increasing spread of infection. Variation in the viral pathogenicity among different strains of the SARS-CoV-2 also accounts to the high infectivity. The receptor protein, ACE 2 of nov. CoV-2 is present in the respiratory epithelium and intestinal epithelium of humans. The heterogeneity and mutation of the virus complicates timely diagnosis.³

Global pandemicity of COVID 19 reports 183,560,151 confirmed cases and 3,978,581 deaths as of 5th July 2021. With 2.7 Million new cases over the previous week, number of weekly deaths has reduced by 10% in the last week of June compared to the previous weeks. Brazil reported the highest number of new cases in the past week, followed by India, Colombia, Russian Federation and Argentina. Among the affected regions across the Globe, 172 countries reported alpha variant, 120 countries reported Beta, 72 countries with Gamma and 96 countries including India reported Delta variant of SARS-CoV-2.⁴

COVID 19 in India:

India witnessed a highly fatal first and second wave of COVID 19 during the past one year. The first exponential peak observed during May- June 2020 declined by January 2021 after which rose to the second peak in May- June 2021.⁵ WHO reports 3.9 Lakh new cases in India during the initial phase of

Corresponding Author : Dr. Arathi Menon

¹PG Student, Dept. of Public Health Dentistry, PCDSRC, Bhopal.

²Prof. & Head, Dept. of Public Health Dentistry, PCDSRC, Bhopal.

³Prof., Dept. of Oral medicine and Radiology, PCDSRC, Bhopal.

⁴Assi. Prof., Dept. of Vete. & Ani. Hus. Ext. Edu., CVSAH, Jabalpur.

⁵Principal, Prof. & HOD, Dept. of OMR, RKDF Dental College of

Research Centre, Bhopal



second wave that gradually augmented by time.⁶ Aftermath of the first wave still exists in the country with an atrocious number of deaths and disabilities. Second wave in India though remained for a shorter time, increased infectivity and the significant challenges in tackling the infection amplified its impact. Ransing et al, 2021 examined the potential barriers in handling the second wave in India. Potential factors such as complex and fragmented health care system, non-utilization of available resources as well as non-availability of resources resulted in the rapid increase in infectivity and mortality rate. The variance in the SARS COV 2 Virus in both first and second wave demonstrates varied symptoms among each.⁷ Second wave showed B.1.1.7 and B.1.617 variants named alpha variants. The rapidly rising cases from day to day has been declined lately suggesting a straightening of the second wave curve.⁸ The current reduction in number of cases are results of the non-pharmaceutical approaches and social restrictions limiting the spread of SARS COV 2. Non conducive weather conditions in spread of virus could also have summed up to the decline in cases, but hints an upcoming peak in infectivity during the monsoon season.⁹

The COVID 19 Third Wave: A Possibility?

A novel variant of the virus, named Delta variant which is a sub lineage B.1.617.2 is suggested to be more infectious. The third wave of delta variant already affected about 96 countries and is reported to have a high transmissibility. WHO stated the mutated variant as a 'Variant of Concern' (VOC). Even a lower exposure to the Delta variant is supposed to infect human respiratory cells pertaining to its rapid spread. Waving off the travel restrictions, mass gatherings and unrestricted social movement contributed to the spread of the variant across the World.¹⁰

Epidemiologists and researchers are estimating the possibility of a third wave in India owing to the already occurred COVID 19 third wave around the Globe. There are epidemiological prediction analyses suggesting a highly fatal third wave with SARS COV 2 Delta variant in India.¹¹ There are several

mathematical models proposed to predict COVID 19 third wave including i) SIR model ii) SEIQR model iii) fractal models.¹² The susceptible Infectious and recovered [SIR] is a classic model that is used to determine the epidemic curve using the 'susceptible individuals for the infection, infected individuals and removed including death or recovery'. Fractional Interpretation of the three factors are done in estimating the predicted positive infectious cases.

Considering the factors in second and third wave of COVID 19 in India, C. Kavitha, A. Gowrisankar and Santo Banerjee predicted the third wave to be initiated during the First week of August 2021 till the end of October 2021. The peak of the third wave is expected during the first week of September this year. According to the fractal model, though the duration of third wave estimated is to be for the same period of time, in contrary to the SIR model, authors suggest the peak of third wave to appear after the month of October. These results suggest an another wave with longer infectivity period.¹² Similar results were obtained by prediction study conducted using Modified SIRD Model by Sakshi Shringi et al. The state wise analysis of the states declares a the third wave with onset from August and Delhi with most number of positive cases.¹³

The results of these proposed models insinuate a COVID 19 third wave in India with a much prolonged period of infection. State wise analysis of the expected positive cases shows an overall reduction compared to the second wave. Some of the Provinces like Delhi, Kerala, Karnataka, Tamil Nadu and Maharashtra are still reporting concerned number of positive cases and are expected to be hit by third wave.¹²

This time, children are considered to be more prone to the infection but there are merely literature evidences suggesting this. The possibility of the newly mutated variant to infect children mostly, as they are non-immunized, are not negligible even though the symptoms would be minimal. Reopening of schools, play areas and recreations for children increases the risk of infection among kids. Failure in following the proper COVID 19 protocol by children due the



behavioral constraints aggravates the spread among them.¹⁴

There are social, cultural as well as behavioral factors determining the third wave of COVID 19 in India. Inappropriate behavior of the public violating the COVID 19 protocol and botching attitude towards the precautionary measures increases the susceptibility of infection. India being a highly populated country, vaccinating the whole population is a challenge. Decreased vaccine acceptance in public due to cultural and beliefs also aggregates the risk of infection.

Overcoming the third wave:

With the first and second wave catastrophically appeared in India, the preparedness for an another wave determines the impact of the upcoming third wave. Third wave of COVID 19 can be tackled effectively with definite precautions and policies formed.

Preventive measures including complete immunization of the inhabitants, including children through mass vaccination campaigns could help in achieve herd immunity. Educational measures by providing COVID 19 awareness, and effects of following a healthy diet and exercise in improving the immunity. Apart from this, Social changes can be brought about by reassessing health care policies by incorporating COVID 19 victims in national health insurance schemes. Training of the individuals and small population for independent self- skill programs could provide an opportunity for the daily living income for the unprivileged. With both the waves India's preparedness for another wave is utmost clear and defined. Following these measures India could possibly prevent and overcome the expected COVID 19 third wave.

Funding: No funding was received for this article.

Declaration of interest: No competing interest declared.

Ethics approval and consent to participate: Not applicable.

REFERENCES:

1. X. Chen, J. Tian, G. Li, G. Li Initiation of a new infection control system for the COVID-19 outbreak *Lancet Infect Dis* 2020, published online February 18.
2. Jieliang Chen, Pathogenicity and transmissibility of 2019-nCoV- A quick overview and comparison with other emerging viruses, *Microbes and Infection*, 2020 Volume 22, Issue 2: 69-71
3. <https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions> accessed on 07/07/2021.
4. J.M. Read, J.R. Bridgen, D.A. Cummings, A. Ho, C.P. Jewell Novel coronavirus 2019-nCoV: early estimation of epidemiological parameters and epidemic predictions medRxiv (2020) [in press]
5. WHO -COVID-19 Weekly Epidemiological Update Edition 46, published 29 June 2021.
6. Mane, V., Bhalerao, P. The potential role of Monsoon-induced humidity in India's unexpected Covid-19 case decline and subsequent rise considering seasonality. *International Journal of Epidemiology and Health Sciences*, 2021.
7. WHO, Coronavirus Disease (COVID-2019) Situation Reports, <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
8. Jalali SF, Ghassemzadeh M, Mouodi S, Javanian M, Akbari Kani M, Ghadimi R, Bijani A. Epidemiologic comparison of the first and second waves of coronavirus disease in Babol, North of Iran. *Caspian J Intern Med* 2020 Fall;11(Suppl 1): 544e50
9. Singh, V.B. The human costs of COVID-19 policy failures in India. *Nat Hum Behav* 2021.
10. Wan Yang, Jeffrey Shaman. COVID-19 pandemic dynamics in India and impact of the SARS-CoV-2 Delta (B.1.617.2) variant (preprint)
11. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/media-resources/science-in-5/episode-45---delta-variant> accessed on 08/07/2021.
12. Fisayo T, Tsukagoshi S. *Postgrad Med J* Accepted 30 June 2020 *Postgrad Med J* 2021;97:332.
13. C. Kavitha, A. Gowrisankar, Santo Banerjee. The second and third waves in India: when will the pandemic be culminated. *Eur. Phys. J. Plus* 2021 136:596
14. Sakshi Shringi, Harish Sharma, Pushpa Narayan Rathie, Jagdish Chand Bansal, Atulya Nagar. Modified SIRD Model for COVID-19 Spread Prediction for Northern and Southern States of India, *Chaos, Solitons & Fractals* 2021 Volume 148 ISSN 0960-0779, <https://doi.org/10.1016/j.chaos.2021.111039>.
15. Sharma A, Verma Sk, Tyagi Mn, Sharma S, Yadav Op. Covid The Third Wave. *International Journal Of Innovative Research In Technology*. 2021 198-200.

