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DOUBLE MUTANT OF SARS-COV-2 AND SURGE OF SECOND WAVE OF COVID-19

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ABSTRACT

Globally the impact of the second wave of coronavirus infection is rapidly seen and new cases continue to rise, with increasing spreadability and mortality rate. In India, the effect of the second wave of corona infection is more prominently seen in Maharashtra, when double mutant strain B.1.617 was detected in positively tested people, which is considered to be more infectious than the original one. This review focused on the study of various mutants of the coronavirus, and how a new variant of COVID-19 is different from the original one.

INTRODUCTION

The double mutation happens when two mutated strains of a virus come together and form a third strain. In India, E484Q and L452R are the two mutated strains that have combined and form a new strain, now classified as B.1.617.The new variant disperses easily and quicker than any other variant. All mutations or variants may not be transmissible or create an infection, and there is still no clarity on which strain causes which symptoms. Nowadays, we are seeing new COVID-19 strain, and some newer symptoms are found in patients like fever, pain in muscles, dry and persistent cough, and loss of smell and taste. In addition to conjunctivitis, sore throat, headache, rashes, upset stomach, and discoloration of fingers and toes. It's been more than a year since the deadly coronavirus is infecting people in India, and even after several efforts to contain the spread of it, the second wave of the virus is currently spreading like wildfire in the nation. India, which is the second-worst COVID-hit country, currently has over 13 million cases with Delhi recording around 8,521 cases on Friday (April 9). A new COVID-19 variant is said to be behind rising COVID-19 cases in India has just been detected in California's Bay Area. The Stanford Clinical Virology Lab identified the so-called "double mutant" variant through genomic sequencing of coronavirus tests, according to the San Francisco Chronicle. India's Ministry of Health labelled the variant as a "variant of concern" in late March. Indian health officials called a "double mutant" to this particular variant, It has two mutations in the spike protein of SARS-CoV-2, the virus that causes COVID-19, and has caused about 20% of new cases in India's Maharashtra region. "Such mutations confer immune escape and increased infectivity," These mutations have been found in about 15-20% of samples and do not match any previously catalogued variants of concern." The Ministry of Health also said that officials in India are "continuing to further analyze the situation. It's understandable to have questions after hearing this news. Is the

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double mutant variant more contagious than other types of COVID-19, and are you protected against it if you've had the vaccine? A variant is a change from a virus's original form. Viruses constantly change through mutation and new variants of any virus including COVID-19 are expected, according to the centers for Disease Control and Prevention (CDC). Sometimes new variants pop up and disappear, and other times they persist and spread. This new COVID variant is called a "double mutant" because "it has two mutations that researchers are interested in that are in the spike protein," infectious disease expert Amesh A. Adalja, MD, senior scholar at the Johns Hopkins Center for Health Security in Maryland, tells *Health*. The spike protein in SARS-CoV-2 is what the virus uses to latch onto your cells and replicate. What's unclear right now is whether the double mutant strain *only* has those two mutations or if they're just the ones that researchers are interested in at this point. (Miller, Apr 5, 2021)

Impact of E484Q and L452R Mutant on COVID-19

V K Paul, NITI Aayog Member (Health), has arranged the press conference and said that 187 cases have been detected positive for the UK strain of SARS-CoV-2 in the country so far, while six cases have been detected with the variant of South Africa. One case has been detected with the variant of Brazil also, said that in Maharashtra, Kerala, and Telangana the N440K and E484Q variants of SARS-CoV-2 have been detected. Paul said the other three mutated variants, one every from the UK, South Africa, and Brazil are before now present in India. But there is no reason for us to think presently, based on scientific information, that they are responsible for the increase of the epidemic in some districts of Maharashtra and Kerala (PTI, 2021) Experts, reported that viruses stay on altering their structure, which is called as mutation, in small ways as they spread their infection from one human to another. (Jeffery K. Taubenberger, 2020) While most of such mutations are not dangerous and unsuccessful to alter the virus's actions, some of the strain can start changes in spike protein, such as coronavirus may alter the spike protein to enter the human body. Experts said a "double mutant" is more communicable, which has a fast rate of morbidity and mortality and may leave the vaccine ineffective. Covid-19 vaccines now available across counties over the world so far have properties that generate "neutralizing antibodies" in the host body, which can fight with virus from entering the body, but expert says "double mutants" can escape these antibodies. (Shibo Jiang, 2020) The analysis of samples from Maharashtra shown more fraction of E484Q and L452R mutations compared to December 2020.

What is the B.1.617 variant of SARS-CoV-2?

Tabassum Barnagarwala reported in Indian Express on 20th April, E484Q and L452R mutant change their genomic sequence together from a new variant called "B.1.617".Together, E484Q and L452R are strongly infectious, and can evade antibodies, these two present in spike proteins of virus and increases the binding capacity to ACE2 receptor in host cells, (Marios Mejdani, 2021) B.1.617 variant of SARS-CoV-2 are more infectious and more viral replication. This new variant was reported to found for the first time in Maharashtra from India. In January and February of 2021, more than 234 samples were sequenced from 18 districts and data analysis shows more than 150 samples from 16 districts were had this new strain of coronavirus.

Is B.1.617 variant of SARS-CoV-2 is harmful

The Director of the National Centre for Disease Control (NCDC), Dr. Sujeet Singh has pointed out that we cannot conclude how this double mutant is harmful, as very few samples from Maharashtra have been sequenced so far However, Clinicians and district administrators in Maharashtra are pointing over that unlike in the first wave, entire families are getting infected in the second wave. This could indicate either that people are now not taking the preventive measures in the family or that the virus mutant is more spreadable and infectious.

Dr. Gangandeep Kang, professor of microbiology at Christian Medical College, Vellore, said the link between double mutant of coronavirus and surge of the second wave of infection may be shown if there would be repeated sample sequencing per week done, meanwhile 1 % of the sample should be

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sequenced per week and if 60.9 % samples carrying this variant "most likely" showed a link between the mutation and the surge. Dr. Gautam Menon, professor at Ashoka University, Sonepat, and the Institute of Mathematical Sciences, Chennai, says, we need more time to suggest that the surge of the second wave of corona infection is due to the new mutant, and to support this expert will require more genome sequencing data. One more thing which has been currently discussed among people is that the double mutant can evade the vaccine too, as few people have indeed been infected after the first dose, but there is no data on whether their samples were sent for genome sequencing Dr, Kang said "We know that the South African variant is more capable of escaping immune response. We know that the UK variant is the most transmissible. But we know nothing about B.1.617 so far because we are not putting together data to conclude,"(Figure 1). According to new studies B.1.617 corona variant transmits more easily and quickly than other variants. Health experts have reported that those who test positive for the new variant are more likely to show symptoms like a persistent cough, tiredness, muscle aches, headache, sore throat, vertigo, conjunctivitis, nausea, skin rash, and fever compared to those who have the original strain. (MadeleineJohansson, 2021)(Figure 2)

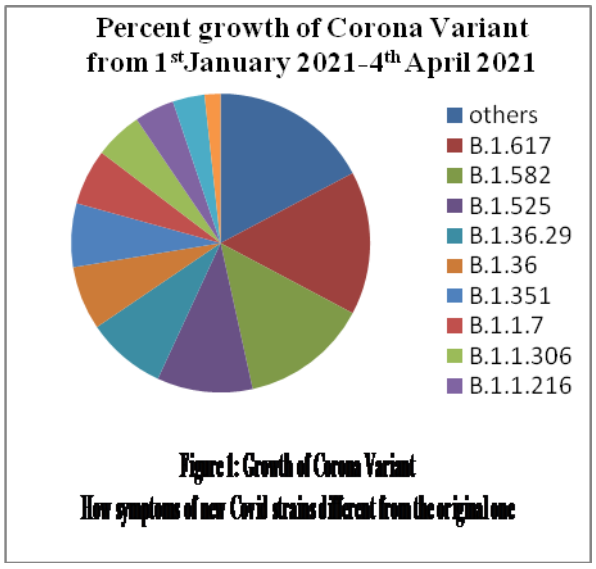

Figure 1: Growth of Corona Variant

How symptoms of new Covid strains different from the original one

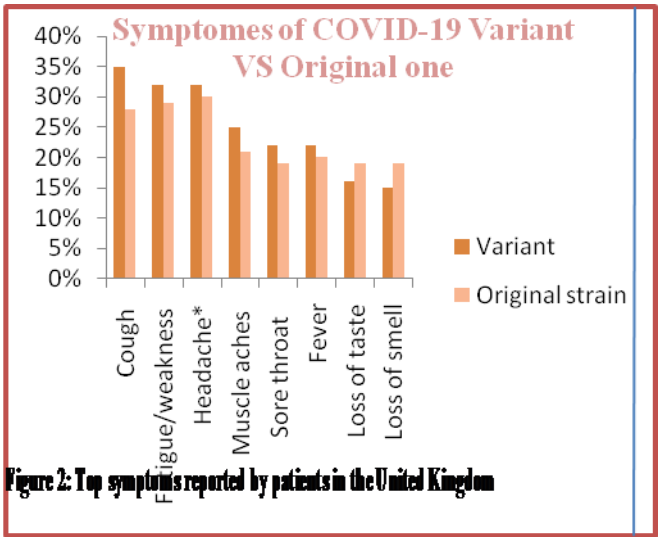

Figure 2: Top symptoms reported by patients in the United Kingdom

CONCLUSION

Based on the latest report we may conclude that the link between double mutant of SARS-CoV-2 and surge of the second wave of COVID-19 is still not confirmed. As some mutants are resistant to naturally induced resistance, the discovery of potential vaccines still underway, to cover these new variants. Ongoing observation and suppression actions need to be strengthened to avert the emergence of new variants by minimizing viral replication.

Conflict of Interest: The authors have reported no conflict of interest

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