



REVIEW OF COVID -19 VARIANTS AND VACCINE EFFICACY – A SYSTEMATIC REVIEW

Health Science

Parvathy R

ABSTRACT

In December 2019, a novel coronavirus (CoV) emerged from Hubei province in China among people visiting the Huanan seafood market in Wuhan. The virus is transmitted through human-to-human contact and rapidly spread across the world, and soon turned into a pandemic. Continuation of precautionary measures, genomic surveillance and vaccination plays an important role in the prevention of spread, early identification of variants, prevention of mutations and viral replication, respectively.

KEYWORDS

SARS CoV-2, Mutations, Vaccines, Variants of Concern, Pandemic, Double mutant variant, Triple mutant variant

INTRODUCTION

Coronavirus Disease-2019 (SARS-CoV-2) started its devastating trajectory into a global pandemic in Wuhan, China, in December 2019. Ever since, several variants of SARS-CoV-2 have been identified. In the present review, we aimed to characterize the different variants of SARS-CoV-2 and explore the transmissibility.

Coronaviruses (CoV) are a family of single-stranded RNA viruses that can transmit infections human to humans (HCoV) documented over 50 years. Mutations in the viral genome sequence give birth to different variants. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a beta coronavirus that belongs to the Coronaviridae family. SARS-CoV-2 is an enveloped spherical-shaped virus.

A change in the genetic sequence is called a mutation. Genomes that differ from each other in genetic sequence are called variants. Variants can differ from each other by one or more mutations. The Centre of Disease Control and Prevention (CDC) will update the variant strains in the different classes. According to the report of April 21, 2021, the classes are: variant of interest, variant of concern, and variant of high consequence.

MATERIALS AND METHODS

To understand the impact of SARS-CoV2 variants on spread of Covid19 epidemic, we collected data from related papers and reports published from 2019 to 2022 through a systematic search utilizing the keywords in online databases including Scopus, Pub Med and Google scholar etc.

Table: 1

Sl No:	Variant ID	Place of identification	Date of identification	Transmissibility
1	U.K Variant (B.1.1.7)	UK	September 2020	40-80% transmissibility and approximately 55% mortality
2	South African Variant (B.1.351)	South Africa	October 2020	Increased transmissibility
3	Brazilian Variant (P.1)	North Brazil	December 2020	2.2 times higher transmissible
4	Brazilian variant (B.1.1.28)	Brazil	December 2020	Moderately transmissible
5	US Midwest variant (20 C-US)	Ohio	December 2020	No evidence of increased transmissibility
6	US San Francisco Bay Variant (B.1.427 & B.1.429)	California	February 2021	20 % increased transmissibility
7	US Southern California variant	Southern California	July 2020	More transmissible

8	B.1.526 & B.1.525	New York	November 2020	More resistant
9	Double mutant variant (B.1.617)	India	October 2020	Increased transmissibility
10	Triple mutant variant (B.1.618)	India	April 2021	Increased transmissibility
11	20 A.EU 1	Spain	June 2020	Increased transmissibility
12	20 A.EU 2	France	June 2020	Decreased transmissibility
13	20 A/S: 439 K	Ireland		Moderate transmissibility
14	20 A/S: 98F	Belgium & Netherlands		Moderate transmissibility
15	20 C/S:80 Y	Europe		
16	20 B/S: 626S	Europe		
17	20 B/S: 1122L	Sweden, Norway & Denmark		
18	N440K	Andra pradesh		Increased transmissibility

Table: 2 Efficacy of vaccines on Covid variants (VOC) during clinical trials

Variants	Pfizer – Biotech mRNA	Moder na mRNA	Aztra zeca (AZD1 222)	Johnson & Johns on (Viral vector)	Covax in (Viral vector)	Coron avac (Inact ivated virus)	Novavax (Protein subunit)
B.1.1.7			55-81 %				89 %
P1	95 %		55-81 %	66 %			
B1.351	95%		55-81%	66%			89 %
B1.427	95%	94%	55-81%	66%			89 %
B1.429		94%	55-81%	66%			89 %
B.1.617					78%		

CONCLUSION

The emerging variants not only result in increased transmissibility, morbidity and mortality but also have the ability to evade detection by diagnostic tests, exhibits decreased susceptibility to various treatment.

None of the vaccines are 100 %effective in the prevention of Covid 19 illness. By this study, it is able to conclude that m-RNA vaccines are more effective in the case of most of the Variants of Concern.

REFERENCES

- SayedAlinaghi *et al.* *Eur J Med Res* (2021) 26:51 <https://doi.org/10.1186/s40001-021-00524-8>. "Characterization of SARS-CoV-2 different variants and related morbidity and mortality: a systematic review".
- Deepa Vasireddy, f , Rachana Vanaparthib, Gisha Mohanc, Srikrishna Varun Malayalad, Paavani Atlurie, "Review of COVID-19 Variants and COVID-19 Vaccine Efficacy". *J Clin Med Res*. 2021;13(6):317-325
- Ling Xue a , Shuanglin Jing a , Kai Zhang a , Russell Milne b , Hao Wang c , "Infectivity versus fatality of SARS-CoV-2 mutations and influenza" *international journal of infectious diseases*. 121(2021)195-202

4. John S. Tregoning , Katie E. Flight, Sophie L. Higham, Ziyin Wang and Benjamin F. Pierce. "Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape" October 2021 | volume 21