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IP Indian Journal of Immunology and Respiratory Medicine

Journal homepage: <https://www.ipinnovative.com/journals/IJIRM>

Editorial

The coronavirus disease 2019 vaccine-A step to halt the devastation by the pandemic of SARS-CoV-2

Sankalp Yadav^{1,*}, Gautam Rawal²

¹Dept. of Medicine & Tuberculosis, Shri Madan Lal Khurana Chest Clinic, Moti Nagar, NDMC, New Delhi, India

²Dept. of Respiratory Intensive Care, Max Super Specialty Hospital, Saket, New Delhi, India



ARTICLE INFO

Article history:

Received 11-11-2020

Accepted 02-12-2020

Available online 15-12-2020

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The current pandemic of Coronavirus Disease 2019 (COVID-19) has resulted in large-scale morbidity and mortality.¹ This highly contagious disease which was reported for the first time from China has spread rapidly and plagued the whole world thus becoming a massive crisis for global public health.^{2,3} This pandemic has not only led to the loss of lives but has hit the economies of various countries and the estimate of the losses is in trillions of dollars to date.^{1,4} All the countries whether developed, underdeveloped, or developing ones are affected equally.⁵ However, the situation in underprivileged countries is graver.⁵ The general public is in grip of fear and thus the chaos due to COVID-19 is not only economical but also social and psychological.³ The current situation demands a prompt and positive resolution through either an anti-SARS-CoV-2 vaccine or a drug.^{2,3} The current paper highlights the various vaccines that are under development in India, which is having some of the largest producers of vaccines by volume in the world for a long time.

The research and development (R&D) of the vaccine against a particular pathogen is a long and tedious process.⁴ As seen in the past during the Zika virus epidemic the vaccine development took much time and was not even available till the epidemic waned.⁶ However, in the present scenario, the vaccine seems the only hope to control or to

stop this pandemic of COVID-19. There are 44 candidate COVID-19 vaccines which are in clinical development and 151 in preclinical development, by use of a range of vaccine platforms.^{1,7} The vaccine R&D is well supported financially and politically the world over. In India the following vaccines are under various stages of development:-

The Covishield vaccine- This is the first 'made in India' vaccine which is under trial at the Serum Institute of India (SII) in Pune, Maharashtra.⁸ The phase 3 human trials of Oxford-AstraZeneca's Covid-19 vaccine AZD1222 have been conducted in SII as Covishield vaccine.⁸ The SII has applied for the emergency use authorization (EUA) of this vaccine from the Drugs Controller General of India (DCGI).⁸ Making it the second such drug producing company after Pfizer-BioNTech.⁸ The SII has shared interim data with the DCGI of four clinical trials — one in India, two trials in the UK, and one in Brazil.⁹ Besides, there is news of the cost of this vaccine ranging between 500 INR to 600 INR with the Government of India would get it in around INR 225 to INR 300.⁸ However, SII has not yet revealed the price of this vaccine to date.⁸ This vaccine is reported to be well-tolerated and also efficient in preventing COVID-19 in the 'targeted population'.⁸ Also, this vaccine can be stored at temperatures between two degrees Celsius and eight degrees Celsius thus making it logistically more feasible for use and distribution in India.⁹ As per the ICMR, the SII has already manufactured 40 million doses of the

* Corresponding author.

E-mail address: drsankalpyadav@gmail.com (S. Yadav).

vaccine under the at-risk manufacturing and stockpiling license is obtained from the DCGI.⁹

The Covaxin vaccine- This vaccine is developed by Bharat Biotech Ltd, Hyderabad.⁹ The vaccine is being developed with the Indian Council of Medical Research (ICMR) and is undergoing phase-3 trials in over 25 centers across India.⁹ The pharmaceutical company has applied for the EUA from the DCGI on the evening of 7th December 2020 making it the third pharmaceutical company seeking such permission in the world.¹⁰ The phase 3 trials of this vaccine are going on the 25000 subjects in India and the results are expected to be available by February 2021.¹⁰

The ZyCov-D vaccine- It is the vaccine developed by the Zydus Biotech Park in Ahmedabad and at its acquired facility Etna Biotech in Italy.¹¹ This is an indigenous DNA based vaccine being developed by Zydus Cadila.¹¹ This vaccine is expected to reach phase 3 trials by December 2020 and the company is expecting to launch it by March 2021.¹¹ ZyCov-D is a plasmid DNA vaccine unlike the other dead and live virus vaccines.¹¹ Besides, the vaccine is supposed to be relatively stable and is also not required to have lower cold chain requirements thereby making it suitable for transport and use in remote regions of India.¹² As per the pharma company, the advantage of ZyCov-D is that it is made similar to the platform used for developing vaccines against SARS and MERS Cov-2 thus making it easy to adapt, even if the virus is going to mutate.¹¹ Another advantage is it does not require a very high biosafety level, can quickly scale up manufacturing and the liquid vaccine will be undemanding in last-mile immunization.¹¹ In short the ZyCov-D vaccine is proposed to be superior to other vaccines that use mRNA to induce an immune response, such as those in development at CureVac, Moderna and BioNTech, and Pfizer since all of these typically need to be transported along cold chains.¹² Thus it could limit the access of such vaccines in remote areas especially in countries like India.¹²

To summarize a cautious validation of efficacy and adverse reactivity of these vaccines is imperative as a successful COVID-19 vaccine will be aimed at the population that includes high-risk individuals over the age of sixty, particularly those with chronic co-morbid conditions, frontline healthcare workers, and those involved in essentials industries like police, sanitization staff, etc. The current pandemic of COVID-19 has put breaks on the global health and economy and a successful and efficient vaccine is the need of the hour.

Acknowledgements

Nil.

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Cite this article: Yadav S, Rawal G. The coronavirus disease 2019 vaccine-A step to halt the devastation by the pandemic of SARS-CoV-2. *IP Indian J Immunol Respir Med* 2020;5(4):196-197.