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A REVIEW ON COVID-19 VACCINES

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ABSTRACT

Coronavirus disease (COVID-19) is a transmissible ailment produced by a newly exposed coronavirus. The disease was 1st informed in Wuhan, China a end of 2019 and has caused in 1.71 million global deaths and over 77 million infections. Common symptoms of the disease include fever, dry cough, and fatigue. This literature review aims to summarize the following topics: review the clinical trials conducted on nine COVID-19 vaccines and follow their efficacy and modes of action through the three stages of the vaccine clinical development process. The analysisfollows the individual vaccines through the three trials, examining and drawn results to identify their capacity to contain severe acute respiratory syndrome (SARS-CoV-2). Four COVID-19 vaccines have been approved for use in different parts of the world and many other vaccines are under clinical trials 1, 2 and 3. In conclusion, these vaccines which are under clinical trials provide a great hope to fight against COVID-19 in near future.

KEYWORDS: COVID-19, Coronavirus, Corona vaccine.

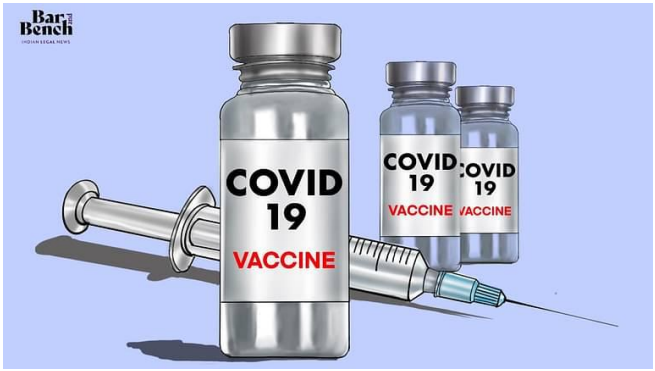
INTRODUCTION

World Health Organization (WHO's) official definition of COVID-19 is that it is a viral disease caused by a new coronavirus. It was first reported on the 31st of December 2019 in the Wuhan Province of China. First recognized in the mid-1960s, COVID-19 belongs to a larger family of respiratory viruses called Coronaviridae and affects both humans and animals (Demeco et al., 2020) and are also known to cause severe respiratory infections such as severe acute respiratorysyndrome (SARS-CoV), middle east respiratory syndrome (MERS-CoV), and now globally famous novel coronavirus severe acute respiratory syndrome (SARS-Cov-2) and the disease is named as COVID-19 by WHO.[1,2]

Nose, or mouth (Center for Disease Control (CDC), 2020). COVID-19 droplets can land at a distance of up to 1.8 M and survive upwards of 2 hours to two days. Traces of the virus have alsobeen found on infected people's stool but no infection through stool has been confirmed yet. The virus can be prevented and controlled through a variety of measures against daily routines, with the most effective one being the avoidance of touching one's mouth, nose, and eyes (Center for Disease Control (CDC), 2020). Other measures include avoiding close contact with infected people, remaining at home if infected, regularly cleaning and disinfecting surfaces, maintaining proper hygiene practices especially when coughing or sneezing, using facial covering equipment like face masks and face shields when in crowded places and regularly washing your hands with soap and plenty of water or hand sanitizers.[11]

Where was COVID-19 first discovered?

The first infections from SARS-CoV-2 were discovered in Wuhan, China. The inventive source of viral spread to humans remains unclear, as does whether the disease became pathogenic beforeor after the spillover event.[9,17]



Covid 19 vaccine.

First COVID-19 COVAX vaccine doses administered in Africa

"This is a day numerous of us have been imagining of and employed for more than 12 months," said **Dr Tedros Adhanom Ghebreyesus, WHO Director-General**. "It's gratifying to see the fruitof that labour. But success is still to come. This is only the opening of what COVAX was set up to achieve. We have a lot left to do to grasp our idea to start vaccination in all countries within thefirst 100 days of the year. There are just 40 days left."[12]

Recent updates

- About the world, there are now 137 COVID-19 vaccine applicantssuffering clinical trials and 194 candidates in pre-clinical development.

- An oral vaccine developed by Dream Tec Research Limited, a Hong Kong based biotechnology company, has completed a study which found that the technology team has prospered engineering Bacillus subtilis with spore coat proteins resembling the proteins ofthe nucleus and spikes of coronal virus. This product could have a vaccine like activity within the intestinal environment. This is one of the first examples of a bacterial vaccine.

The preclinical stage

This stage is usually aimed at finding synthetic or natural antigens that trigger a reaction similar to that triggered by the actual virus. This process is known for its notoriety for it can even take upwards of four years which might spark the question of how the quest for the COVID-19 vaccinehad the right antigen identified in just a couple of months.[6,7]

Phases 1, 2a and 2b

This stage essentially seeks to identify whether the vaccine is safe and what the right dose of it is safe for human administration.[2,8] Initial testing of the vaccine is conducted in phase 1, is aimed at measuring its generated immune response, assessing the vaccine's safety, and involves a small group of test subjects, usually between 20 and 80 (Levine, 2020). Phase 2a not only seeks to broaden the safety scope of the vaccine but also find its correct dosage although they are said to be pilot trials since clinical trials at phase 2b are pivotal studies aimed at affirming phase 2a findings. Phase 2a trials are conducted on 100–300 subjects while phase 2b trials are done on a larger number of subjects.[19]

Phase 3

Phase 3 trials usually involve upwards of 3000 subjects and usually employ a randomized placebo- controlled approach to administer the vaccine in the trial.[25] In this case, half the subjects receive the vaccine while the other half receive a placebo (control) but without knowledge of who gets what. The trial is meant to analyse the performance of the vaccine compared to already existing vaccines.

India Approves two Covid vaccines for children under 12

- Covaxin, made by Bharat Biotech, has been granted alternativeusageauthorization for the 6 to 12 age group, health minister MansukhMandaviya tweeted.
- It is previouslymanaged to children aged 12-18, and adults.
- Two other vaccines have also been given backupsupport - Corbevax for children aged 5-12; and Zydus's 2-dose jab for children above twelve.

- Corbevax is also presentlyactualitydirected to children in the 12-14 age group.

Covaxin vs Covishield – A Detailed Comparison – Efficacy, Side effects

Covaxin has been established by Hyderabad-based Bharat Biotech International Ltd in association with the Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV). Covaxin is presently irritating to procure World Health Organisationconsent to ease international travel woes for people who have opted for this vaccine. All therelevant documents consume urgently been submitted to the officials of World Health Organisation.[22]

Covishield has been developed by the Oxford-AstraZeneca and is being manufactured by the Serum Institute of India (SII). Doctors are mulling over the need for a booster dose for Covishield as well, considering the fact that the elderly and people with comorbidities may not be producingthe desired immunity response to the Delta variant.[13]

Doses

There is no change b\w the 2 **vaccines** in terms of amount. Both of them are administered as 0.5mlin the upper arm region.

But, the dosing schedule for both vaccines however varies. The second dose of Covaxin is scheduled after 4-6 weeks after the first dose, while for Covishield vaccines it is 84 days or 12-16weeks after the 1st dose.

Storage Guidelines

Both Covishield and Covaxin can be stored at 2-8° Centigrade, which is a household refrigerator temperature. This makes both the vaccines most suited for Indian conditions as

most of the vaccines here are kept at the same temperature range.This also makes the transportation and storage of both vaccines easier.[30,32]

Efficacy

Both the vaccines have shown more than satisfactory results ever since the inoculation started in India.The effectiveness of the Covishield vaccine is nearly 90% as per the global reports and Covaxin's 81% according to interim 3rd phase trial results.[13]

Side effects

After getting vaccinated, you may experience pain at the site of injection. Some people may also experience side effects such as headaches, joint pain and may feel feverish. These side effects donot persist for long and generally go within a day or two.

Approvals

Covaxin has currently been granted approval for emergency restricted use, while Covishield has been allowed for restricted use in emergency situations that can potentially prevent coronavirus infection in people aged 18 years and above.

Covaxin has begun its clinical trial in children aged above 2 years of age.However, the Drugs Controller General of India (DGCI) has not given a market use authorization clearance to any of the vaccines till now.[33,36]

Price of the vaccines

Both the vaccines are being inoculated free of cost at government health set-ups. However, the cost of vaccines at the private hospital varies. Thus, you should always contact the hospitals for the exact cost of the vaccine.[17]

Mode of administration

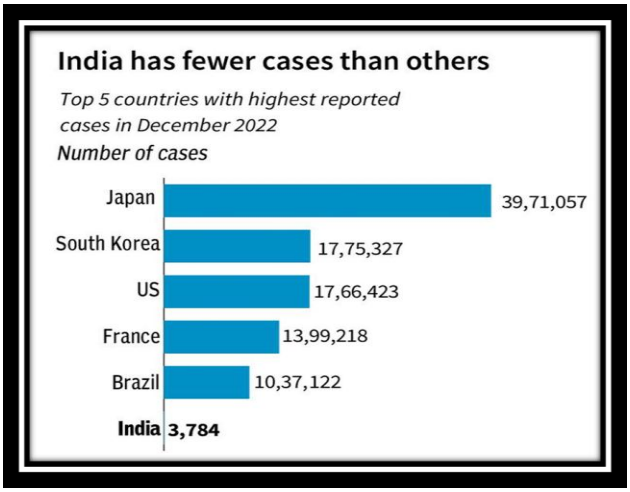
Both Covaxin and Covishield are intramuscular vaccines.

Covid Cases in India [WHO Coronavirus (COVID-19) Dashboard]

Cases Deaths

4.46Cr 5.29L

LOCATION	CASES	DEATHS
Maharashtra	**81.2L**	**1.48L**
Kerala	**68L**	**71,110**
Karnataka	**40.6L**	**40,281**
Tamil Nadu	**35.8L**	**30,046**
Andhra Pradesh	**23.4L**	**14,733**
Uttar Pradesh	**21.3L**	**23,619**
West Bengal	**21.1L**	**21,499**
Delhi	**20L**	**26,501**
Odisha	**13.3L**	**9,191**
Rajasthan	**13.1L**	**9,639**
Gujarat	**12.7L**	**11,033**
Chhattisgarh	**11.8L**	**14,131**



Differences between the First and the Second wave of COVID-19 in India.

PARAMETERS	FIRST WAVE	SECOND WAVE
Causative organism	SARS-Cov-2 virus	Several mutants of SARS-Cov-2 virus
Knowledge about the disease	Less	More
Symptomatology	More related to respiratory system	Newer symptoms like Gastrointestinal etc. adding
Presentation	More severe	Lesser intense
Shortness of breaths	Less cases withbreathlessness	More cases withbreathlessness
Age profile of the patients	More older population	More younger population
Comorbidities	Patients with comorbidities affected more	Less
Drug availability	Acute shortage and black marketing	Available in the hospitals and pharmacies
Health care workers	• Lesser trained people	• More trained increased

	• Fear of acquiring infection • Not vaccinated	• Lesser fear to acquireinfection • Mostly vaccinated
Bed capacity	Limited	Enhanced
Ventilator beds	Less than 25000	Increased to more than 50000
Laboratory testing	Only one laboratory in January 2020	More laboratories in Privateand Government center
PPE	Scarcity	Plenty one million PPEproduced
Vaccine	Not available	Three approved vaccinesavailable
Treatment affordability	• Increased test price • Increased treatment cost andPPE	• Markedly reduced test price • Reduced treatment cost andPPE
Oxygen requirement to the patient	Less	More

Common side effects of COVID-19 vaccines

Like any vaccine, COVID-19 vaccines can cause side effects, most of which are mild or moderateand go away within a few days on their own. As shown in the results of clinical trials, extra seriousor extended-lasting side effects are possible. Vaccines are continually monitored to detect adverseeffect.[40]

Less common side effects

Upon receiving the vaccine, a person should be requested to stay for 15–30 minutes at the vaccination site so health workers are available in case of any immediate reactions. Individuals should alert their local health providers following vaccination if they experience any unexpected side effects or other health events – such as side effects lasting more than three days.[22]

Long-term side effects

Side effects usually occur within the first few days of getting a vaccine. Since the first mass vaccination programme started in early December 2020, hundreds of millions of vaccine doses have been administered.[20,21]

There have been concerns about COVID-19 vaccines making people sick with COVID-19. But none of the approved vaccines contain the live virus that causes COVID-19, which means that COVID-19 vaccines cannot make you sick with COVID-19.

(COVID-19) test numbers across India as of October 17, 2021, by state.

State	Testing Data
Uttar Pradesh	81,382.99
Maharashtra	61,020.46
Tamil Nadu	49,411.82
Karnataka	49,411.11
Bihar	48,215.02
Kerala	36,802.64
Gujarat	30,280.13
Delhi	28,653.03
Telangana	27,022.16

The Novavax(NVX-CoV2373) vaccine against COVID-19

The Novavax vaccine will be manufactured in two different facilities. In Europe, the vaccine will be manufactured under the trade name Nuvaxovid and has been approved by the European Medicines Agency, and in India, the vaccine will be manufactured by Serum Institute of India under the trade name Covovax and has been approved by the Drugs Controller General of India.The WHO Strategic Advisory Group of Experts on Immunization (SAGE) has issued interim policy recommendations for the use of the Novavax (NVX-CoV2373) vaccine. This article provides a summary of those interim recommendations.[36]

[2/2] A woman holds a small bottle labeled with a "Coronavirus COVID-19 Vaccine" sticker and a medical syringe in front of displayed Novavax logo in this illustration taken, October 30, 2020. REUTERS/Dado Ruvic/File

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