

Review Article

COVID-19 vaccination in India: is it in right direction?

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ABSTRACT

Coronavirus disease (COVID-19), is an infectious disease caused by a newly discovered coronavirus (SARS-CoV-2), which has spread rapidly throughout the world. In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic. The pandemic has severely ravaged health systems and economic and social progress globally. In India, 3,36,52,745 confirmed COVID-19 cases and over 4,46,918 deaths have been reported as of 25 Sep 2021. Symptoms of COVID-19 most commonly manifests as fever, dry cough, shortness of breath and tiredness. Most people (80%) experience mild disease and recover without hospitalization, while around 20% may become more seriously affected. While countries, including India, have taken strong measures to contain the spread of COVID-19 through better diagnostics and treatment, vaccines will provide a lasting solution by enhancing immunity and containing the disease spread. In response to the pandemic, the vaccine development process has been fast-tracked. COVID-19 vaccination dry run: just like army drills, dry run is a dummy process that helped the government assesses how ready we are for the COVID-19 immunization at the national level. It also highlighted any shortcomings in the mechanism laid out for the coronavirus vaccine drive so that we can address them before time and avoid any difficulty or problems during the actual immunization process. After administration of vaccine in population and recent research study has been done in India- that efficacy of Covishield vaccine is more than Covaxin vaccine.

Keywords: Covaxin, Covishield, Dry run, SARS-COV-2, Sputnik V

INTRODUCTION

Coronavirus disease (COVID-19), is an infectious disease caused by a newly discovered coronavirus (SARS-CoV-2), which has spread rapidly throughout the world. In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic. The pandemic has severely ravaged health systems and economic and social progress globally. In India, 3,36,52,745 confirmed COVID-19 cases and over 4,46,918 deaths have been reported as of 25 Sep 2021.¹

Not even a year ago, in March 2020, the World Health Organization (WHO) declared that the world was facing a pandemic- COVID-19.

As countries around the world began to prepare a response, it became clear that while social distancing and

mask-wearing would slow the spread of the virus; and therapeutics and drugs would help patients recover, ultimately, only a vaccine would save lives and arrest the unprecedented economic and social disruption caused by the virus. It is at that point when a global quest for a safe and effective vaccine began.

A COVID-19 vaccine is a vaccine intended to provide acquired immunity against COVID-19. Prior to the COVID-19 pandemic, work to develop a vaccine against the coronavirus diseases SARS and MERS had established knowledge about the structure and function of coronaviruses, which is accelerated development during early 2020 of varied technology platforms for a COVID-19 vaccine.

By mid-December 2020, 57 vaccine candidates were in clinical research, including 40 in phase I-II trials and 17

in phase II-III trials. In phase III trials, several COVID-19 vaccines demonstrated efficacy as high as 95% in preventing symptomatic COVID-19 infections.² National regulatory authorities have approved six vaccines for public use: two RNA vaccines (Tozinameran from Pfizer-Biontech and mRNA-1273 from Moderna), two conventional inactivated vaccines (BBIBP-CORV from Sinopharm and Coronavac from Sinovac), and two viral vector vaccines (Gam-COVID-Vac from the Gamaleya Research Institute and AZD1222 from the University of Oxford and AstraZeneca).

Many countries have implemented phased distribution plans (according to risk group) that prioritize those at highest risk of complications, such as the elderly, and those at high risk of exposure and transmission, such as healthcare workers.³ As of 8 January 2021, 17.7 million doses of COVID-19 vaccine had been administered worldwide based on official reports from national health agencies.⁴ Pfizer, Moderna, and AstraZeneca predicted a manufacturing capacity of 5.3 billion doses in 2021, which could be used to vaccinate about 3 billion people (as the vaccines require two doses for a protective effect against COVID-19). By December, more than 10 billion vaccine doses had been pre ordered by countries with about half of the doses purchased by high-income countries comprising only 14% of the world's population the majority of vaccines in clinical evaluation as of 4 December 2020 will require a two-dose schedule to be administered two, three or four weeks apart, and is need to be administered through the intramuscular route.^{5,6}

METHODS

Covid-19 vaccination in India: vaccination drive: how to run

COVID-19 vaccination dry run

Just like army drills, dry run is a dummy process. It tested the planned operations including entry of necessary data in Co-WIN, which is an online platform for monitoring the delivery of COVID-19 vaccine, deployment of team members, and testing recipient. It also included mock drills of session sites, testing of beneficiaries, checking cold storage, transportation arrangements handling crowd at the immunization site, and ensuring physical distancing.

India's drugs regulator on Sunday approved Oxford COVID-19 vaccine Covishield, manufactured by the Serum Institute, and indigenously developed Covaxin of Bharat Biotech for restricted emergency use in the country, paving the way for a massive inoculation drive. "After adequate examination, CDSCO (Central Drugs Standard Control Organization) has decided to accept the recommendations of the Expert Committee and, accordingly, vaccines of M/s Serum and M/s Bharat Biotech are being approved for restricted use in

emergency situations," Drugs Controller General of India (DCGI) Dr V. G. Somoni told the media.

End-to-end dry run on January 2

On January 2, 2021, India commenced a massive end-to-end dry run of the vaccination drive against COVID-19. The dry run is being conducted at 285 session sites, which is spread across 125 districts covering all states and union territories in the country. Union Health Minister Dr Harsh Vardhan said that the mock drill is an exercise to ensure that the actual vaccination programme will run smoothly, efficiently and without any technical.

How to register for vaccination at session site

Common Service centres need to be utilized for self-registration and identity certification of the general population. Self-registration module is made available in the later phases of implementation.

Individuals can select the method of authentication from the following methods

Biometric: with these demographic details of the individual from name to a permanent address in Aadhaar card will auto fill the platform.

OTP authentication: an OTP is sent to the registered mobile number with an Aadhaar card.

Demographic authentication: by identity card.

Photo identity can either be uploaded on Co-WIN system (in PDF, JPG or PNG file formats) or can be pulled from the existing Digi Locker account of the individual. Once registered, date and time is allocated for vaccination.

District collector (DC)/district magistrate (DM) with support of district immunization officer link the session's sites, vaccinators, supervisors and beneficiaries and decide the dates and time for conducting the vaccination session. Respective district administration approves the beneficiaries for session and site allocation. Co-WIN has inbuilt monitoring and reporting mechanism.

Vaccination site

How the sessions have been planned

An ideal session site should have three demarcated rooms/areas: 1. Waiting room/area; 2. vaccination room; and 3. observation room

How the vaccination team has been arranged

Every session is managed by a 5 membered team with defined responsibilities:

Vaccination officer-1: In-charge for pre-checking registration status of beneficiary and photo ID verification before entering the waiting room/area. Vaccination officer-1 will be assisting in making queues/crowd management.

Vaccination Officer 2: In-charge of authenticating/verify document in the Co-WIN system (Health/ICDS/other government departments e.g. election model).

Vaccinator Officer: In-charge of vaccinating the beneficiaries [Doctors (MBBS/BDS/AYUSH), staff nurse, pharmacist, ANM, ASHA].

Vaccination Officer 3 and 4: In-charge of crowd management, ensuring 30-minute wait, monitoring for any AEFI symptoms, guiding non-registered beneficiaries.

Vaccination conducted at the health facilities- both government and private- where either a medical officer or a doctor is available is defined as a fixed session site. Schools and community halls are outreach session sites while there are special mobile teams for remote areas or migratory population and international border areas.

All COVID-19 vaccination sessions are conducted from 9 am to 5 pm.

In 16th January 100 beneficiaries list came from Co-WIN approximately 3,006 vaccination centres in that time.

In India, the decision to vaccinate 30 crore people (1Cr healthcare staff, 2 Cr frontline workers, 26 Cr above 50 years, 1 Cr below 50 with morbidities) against the virus was launched last month on January 16th and is now underway. The planning has been carried out at the state, district and block level.

India has administered over 85 crore total doses so far, till 25 September 2021.⁷

Development stages of COVID-19 vaccine

Covaxin and Covishield

India's drug regulator has given the green light to Covishield (the local name for the Oxford-AstraZeneca vaccine developed in the UK) and Covaxin, locally-made by pharma company Bharat Biotech.

India is a vaccine powerhouse: it makes 60% of the world's vaccines and is home to half a dozen major manufacturers.

How it is work COVAXIN?

CovaxinTM, India's indigenous COVID-19 vaccine Bharat Biotech is developed in collaboration with the Indian Council of Medical Research (ICMR)- National Institute

of Virology (NIV). This indigenous, inactivated vaccine is developed and manufactured in Bharat Biotech's BSL-3 (bio-safety level 3) high containment facility.

The vaccine received approval from Drug Controller General of India (DCGI) for phase I and II human clinical trials and an adaptive, seamless phase I, followed by phase II randomized, double blind, multicentre study to evaluate the safety, reactogenicity, tolerability and immunogenicity of the whole-virion inactivated SARS-CoV-2 vaccine (BBV152).

The home grown government-backed vaccine has been developed by Bharat Biotech, a 24-year-old vaccine maker, which has a portfolio of 16 vaccines and exports to 123 countries.

It is an inactivated vaccine which means that it is made up of killed coronaviruses, making it safe to be injected into the body. Bharat Biotech used a sample of the coronavirus, isolated by India's National Institute of Virology.

When administered, immune cells can still recognize the dead virus, prompting the immune system to make antibodies against the pandemic virus. The two doses are given four weeks apart. The vaccine can be stored at 2°C to 8°C.

Bharat Biotech says it has a stockpile of 20 million doses of Covaxin, and is aiming to make 700 million doses out of its four facilities in two cities by the end of the year.

The two doses are given four weeks apart. The vaccine can be stored at 2°C to 8°C.



Figure 1: Covaxin vial by Bharat Biotech.

What about Covishield?

The Oxford-AstraZeneca vaccine is being manufactured locally by the Serum Institute of India, the world's largest vaccine manufacturer. It says it is producing more than 50 million doses a month.

The vaccine, which is known as Covishield, is made from a weakened version of a common cold virus (known as an

adenovirus) from chimpanzees. It has been modified to look more like coronavirus- although it can't cause illness,

When the vaccine is injected into a patient, it prompts the immune system to start making antibodies and primes it to attack any coronavirus infection.

The jab is administered in two doses given between four and 12 weeks apart. It can be safely stored at temperatures of 2°C to 8°C, about the same as a domestic refrigerator, and can be delivered in existing health care settings such as doctors' surgeries. This makes it easier to distribute than some of the other vaccines.

The jab developed by Pfizer-Biontech, which is currently being administered in several countries, must be stored at -70°C and can only be moved a limited number of times- a particular challenge in India, where summer temperatures can reach 50°C.



Figure 2: Covishield vaccine by Oxford-AstraZeneca.

Russia's Sputnik V has been deemed to be safe, and works in a way similar to the Oxford-AstraZeneca jab which is being made in India as Covishield.



Figure 3: Sputnik V vaccine developed by Gamaleya Institute.

Sputnik V gives around 92% protections against COVID-19. The vaccine, developed by Gamaleya Institute,

initially generated some controversy after being rolled out before the final trial data had been released.⁸

But scientists say its benefits have now been demonstrated.

It uses a cold-type virus, engineered to be harmless, as a carrier to deliver a small fragment of the coronavirus to the body.

Safely exposing the body to a part of the virus's genetic code in this way allows it to recognize the threat and learn to fight it off, without the risk of becoming ill.

After being vaccinated, the body starts to produce antibodies especially tailored to the coronavirus.

This means that the immune system is primed to fight coronavirus when it encounters it for real.

It can be stored at temperatures of between 2 and 8°C, making it easier to transport and store.

Maharashtra continues to lead in doses administered.

India has administered over 85 crore total doses of the anti-COVID vaccine so far, according to data from the Ministry of Health and Family Welfare.⁹

Challenges in COVID-19 vaccination

Possible solution. Way forward, is India COVID-19 strategy in right direction?

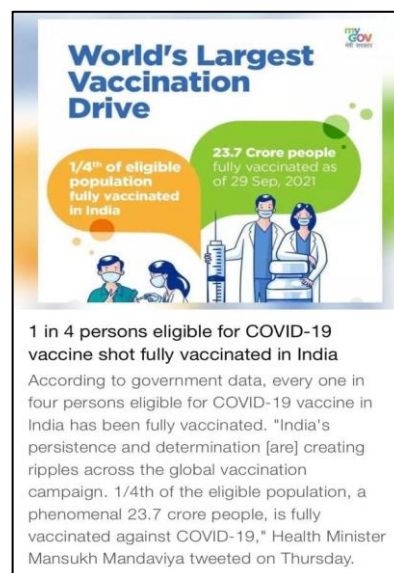


Figure 4: World's largest vaccination drive.

DISCUSSION

For those vaccinated against COVID-19, antibody levels eventually wane, but this is not the whole story. Six

months ago, Miles Davenport and his colleagues made a bold prediction. On the basis of published results from vaccine trials and other data sources, they estimated that people immunized against COVID-19 would lose approximately half of their defensive antibodies every 108 days or so. As a result, vaccines that initially offered, say, 90% protection against mild cases of disease might only be 70% effective after 6 or 7 months.¹⁰ “It felt a little bit out on a limb at the time,” says Davenport, a computational immunologist at the University of New South Wales in Sydney, Australia. But on the whole, his group’s predictions have come true.

Although the Indian COVID-19 vaccination program has had a great start, there are still challenges ahead as this is the first program involving adult immunization, which inherently has many problems. Also, many side effect have started cropping up, which is making it very difficult to convince people about vaccine safety.

CONCLUSION

By recent studies in prestigious institutes of India, has proved that efficacy of Covishield vaccine is more than Covaxin. Efficacy- Covishield- 71%, Covaxin- 69%, Sputnik-V- 91%.

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