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*Case Study*

# Covid-19 Vaccines Across the Globe- A Case Study

***Authors & Affiliation***

Ravi Varala,[1] Chandra Bala Sekharan[2], Hari Bau Bollikolla[3,]*

[1]*Scrips Pharma, Mallapur, Hyderabad-76, Telangana, India*

[2]*Department of Life Sciences, Lalaji Memorial Omega International School, Chennai, TN- 600128, India*

[3]*Department of Chemistry, Acharya Nagarjuna University, N Nagar, Guntur, AP-522510, India*

***Corresponding Author***

Hari Bau Bollikolla

Contact@Email id: dr.b.haribabu@gmail.com

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**Abstract**

A brief study on the status of covid-19 vaccines all over the world is presented for the purpose of better understanding to readers.

***Keywords*:** Covid-19; Vaccine, Immunity; Side-effects; Dosage

## Introduction

Since around September 15th, 2021, WHO recorded 225 million active pandemic covid infections throughout the world, with around 5 million people dying, with the area wise situation displaying in the sequence Americas, Europe, South-East Asia, Eastern Mediterranean, Western Pacific & Africa. As of now 554 million vaccine doses have been administered across the globe. Almost 50 clinical studies are now ongoing by major pharma/bio firms globally in attempt to generate & implement a safety as well as effective vaccine.[1] The function of a vaccine is to fight against external microorganisms that attack on the immune system and to prepare natural body defense. COVAX led by WHO and other allied organizations, smoothly enable distribution of available vaccines to safe guard people from all countries irrespective of creed, poverty. Frontline staff in wellness & social care contexts, in brief, people at risk like suffering from heart, kidney, lung diseases and old aged citizens will be vaccinated in top priority. Being responsible citizens, we need to control transmission by using WHO safety protocols to reduce deaths.

## Results and Discussion

### *Need of vaccines*

In general, many vaccine candidates will be tried for evaluating their safety and effectiveness. Based on recent study, it is assumed that one out of hundred will be proven successful in both lab and animal studies. More the development of vaccine candidates, more will be the chance of successful candidate for the intended purpose.

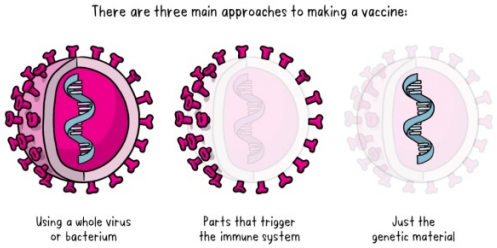


**Fig. 1: Making a vaccine**

***Types of vaccines***

In designing a vaccine, three vital methodologies are considered such as utilizing whole virus/bacterium or the just parts or only genetic material (**Fig. 1**). Much safer vaccine development can take years but keeping in the view of urgent necessity to control such unprecedented diseases like covid 19, trial vaccines have to be rapidly screened and tested on large variety of population. When a COVID-19 vaccine comes available, it is crucial that primacy populations receive the vaccination early in order to prevent severe illness, fatalities, and safeguard health systems.

In first phase, COVAX facility instructed all countries to have immunization approximately 20% of the frontline workers at top priority. Contingency is raised to support near about 100 low/middle-income economies to have enough vaccine resources. Once this process is done, in second phase, intensity of doses will be increased based on health, population and geographical grounds to have good supply chain mechanism Primacy will be provided to nations that may experience sudden epidemics or disasters throughout the allocation process. Apart from the aforesaid allocation methods, certain vaccine doses will really be retained as component of a "humanitarian buffer" (about 5% of doses).

***Design of COVID-19 vaccines and their efficacy study***

Many potential covid-19 vaccines are being developed by scientists around the world, to identify and block the virus. Various vaccines for covid-19 that are in developing or developed stage contain (**Fig. 2**).

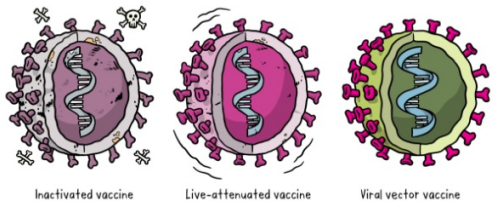


**Fig. 2: Types of vaccine**

*a) Inactivated or weakened virus vaccines Eg: Covaxin (Bharat Biotech, India)-yet to get WHO clearance*
*b) Protein-based vaccines*
*c) Viral vector vaccines*
*d) RNA and DNA vaccines*

All over the world, scientists are working on developing a safer and effective vaccine and a handful of vaccines have been authorized around and many more in developmental stages. WHO is supporting tirelessly with pharma giants to manufacture on large scale and deploy as a game changing tool body. Till the complete control over the evil covid-19 comes through more effective vaccine, we must continue wearing masks, healthy sanitization, keeping excellent ventilation, avoiding groups and physical distancing.

Vaccines consist of antigen, which generates an immune response or marker for generation of active ingredient (**Fig. 3**). Preservatives, surfactants, adjuvant and stabilizers etc. are used for safe usage of vaccine without getting contaminated or decomposing. Later, quality control tests are being done and measures are taken for effective transportation.

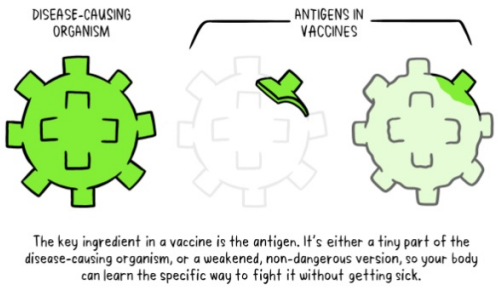


**Fig. 3: Antigens in Vaccine**

WHO Emergency Use Listing (EUL) is a protocol to expedite assessment of unlicensed vaccines to reach common man at the earliest. Dosage and storage of approved vaccines are given below in **Fig. 4**.[3]

**Fig. 4: Marketed vaccines and data of usage**

How some of the Covid-19 vaccines compare

| Company | Type | Doses | Storage |
|---|---|---|---|
| Oxford Uni-AstraZeneca | Viral vector (genetically modified virus) | x2 | 2 to 8°C (6 months) |
| Moderna | RNA (part of virus genetic code) | x2 | -25 to -15°C (7 months) |
| Pfizer-BioNTech | RNA | x2 | -80 to -60°C (6 months) |
| Gamaleya (Sputnik V) | Viral vector | x2 | -18.5°C (liquid form) 2 to 8°C (dry form) |
| Sinovac (CoronaVac) | Inactivated virus (weakened virus) | x2 | 2 to 8°C |
| Novavax | Protein-based | x2 | 2 to 8°C |
| Janssen | Viral vector | x1 | 2 to 8°C (3 months) |

Source: UK government, Reuters BBC

If a virus is extensively spread in a population, it has a higher probability of being modified. Preventing the spread at the source will be crucial in the future. Side effects of a vaccine have to be continuously monitored[4]. Getting vaccinated is safer than getting infected as shown in **Fig. 5**.

People aged 16 years and old are presently eligible for getting vaccinated. Vaccines for children are still in trials. People who are severe allergic tendency should not get vaccinated. Whenever a vaccine is offered, the accompanying adverse effects may occur during a day/two later to vaccination. (**Table 1**).

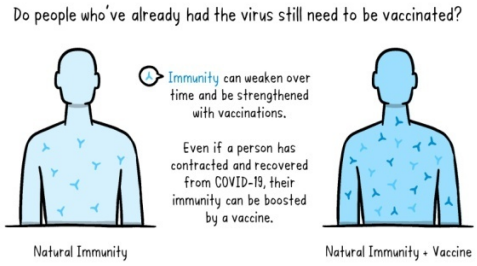


**Fig. 5: Efficacy of vaccine**

**Table 1: Sequel of vaccine**

| Arm where shot is given: | Elsewhere in body: |
|---|---|
| • Swelling<br>• Pain<br>• Redness | • Chills<br>• Headache<br>• Tiredness |

## Conclusion

So far, 30% of total world population got fully vaccinated. As more and more mutations (variants) are occurring in Covid-19 virus, the fundamental duty is to stop the spread and maintain WHO guidelines for safety measurements. There is still need of most effective vaccine against most of/all mutants. Let us hope for the covid-free better world.

## Acknowledgements

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## Conflict of interest

The authors declare no conflict of interest

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