

Evaluation of Time Taken for Implementation and Accomplishment of Covid 19 Vaccination in India

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Abstract:

Introduction: The study was done to assess whether a significant proportion of population got immunized in a fair amount of time compared to that of vaccination strategies of Singapore, and the results will be useful in the event of a future pandemic breakout.

Objectives: To evaluate time taken for implementation of covid 19 vaccination in India and to compare current vaccination approach in India with that of Singapore's.

Methodology: The information was taken from Co-win app that tracks real time COVID-19 vaccination administration in India and was evaluated in total and also on the basis of age, sex and state basis over a period of one year. The website of Ministry of Health, Singapore, was used to collect data regarding the number of individuals immunised in Singapore.

Result: 57.2% and 86.2% of the population has been fully vaccinated in India and Singapore respectively.

Conclusion: Even though population of India is very large, more than half of them are fully vaccinated which is comparable to the percentage of immunisation achieved in a very less populated country like Singapore within a year.

Keywords: COVID -19, immunization, vaccination in India.

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Introduction

Coronavirus disease (COVID-19) is an infectious illness brought on by the coronavirus (SARS-CoV-2) and has been spreading quickly around the globe. The World Health Organization (WHO) categorized the COVID-19 outbreak as a pandemic in March 2020. Global health systems, as well as social and economic advancement, have been heavily affected by the pandemic¹. India is one of the nations that have implemented stringent steps to stop the spread of COVID-19 through improved diagnosis and care. Currently, immunization is the only

known method of preventing COVID 19 infection, which will result in a long-lasting solution by boosting immunity and limiting the spread of the disease 2. Natural herd immunity would not be enough to return society to its previous status. When the majority of the population is immune to an infectious disease, individuals who are not immune will benefit from indirect protection or herd protection².

India is a huge population, which makes immunisation a difficult task. The Covid 19 vaccination campaign in India began in January 2021. On May 1st, 2021, all Indian states began vaccination campaign for those between the ages of 18 and 45. At initial stage of the programme, two vaccines- Covishield, a brand of the Oxford-AstraZeneca vaccine made by the Serum Institute of India, and Covaxin, created by Bharat Biotech were approved for use in emergency situations in India³. The Russian Sputnik V vaccine was authorised by the Indian government as a third vaccine in April 2021. The current vaccination strategy will be evaluated in this study. Using this data, we are assessing whether a significant proportion of the population got immunized in a fair amount of time compared to that of the vaccination strategies in Singapore, and the results will be useful in the event of a future pandemic breakout⁴.

from august 2021 immunization picked up speed within 12 months around 70% of the population was immunized with at least one dose of vaccination. Within this time period, 57% of the population got immunized with two doses of vaccination which is 86% in the case of the Singapore population

	Total number of individuals vaccinated	vaccinated Proportion in India	total number of fully individuals vaccinated in Singapore	vaccinated Proportion in Singapore
Jan-2021			1,186	0.02%
Feb-2021	2,456,191	0.18%	199,474	3.50%
Mar-2021	9,334,695	0.68%	388,060	6.81%
Apr-2021	26,612,155	1.93%	1,119,762	19.64%
May-2021	43,258,810	3.13%	1,740,203	30.53%
Jun-2021	57,748,116	4.18%	2,144,135	37.62%
Jul-2021	101,698,116	7.37%	3,244,696	56.92%
Aug-2021	147,797,142	10.71%	4,233,463	74.27%
Sep-2021	237,476,249	17.21%	4,411,079	77.39%
Oct-2021	329,088,622	23.85%	4,486,548	78.71%
Nov-2021	448,000,946	32.46%	4,564,632	80.08%
Dec-2021	603,224,821	43.71%	4,651,594	81.61%
Jan-2022	705,405,482	51.12%	4,751,367	83.36%
Feb-2022	790,556,254	57.29%	4,914,843	86.23%

Singapore's total population is 5.45 million and India's total population is 138 cores.

Figure 1

Materials and Methods

This observational study assesses the current vaccination strategy in India. The information of vaccinated individuals from January 2021 to February 2022 was taken from Co-win, a digital platform/app that tracks real-time COVID-19 vaccination administration in India, and was evaluated in total and also on the basis of age, sex, and state basis over a period of one year. The website of the Ministry of Health, Singapore, was used to collect data regarding the number of individuals immunized in Singapore. Convenient sampling method was used. This study was reviewed and approved by the institutional ethics committee of Annoor Dental College and Hospital, Muvattupuzha, Kerala. The collected data was statistically analyzed.

Results

Total number of individuals vaccinated in India and Singapore:

India started its vaccination drive in a slow pace and

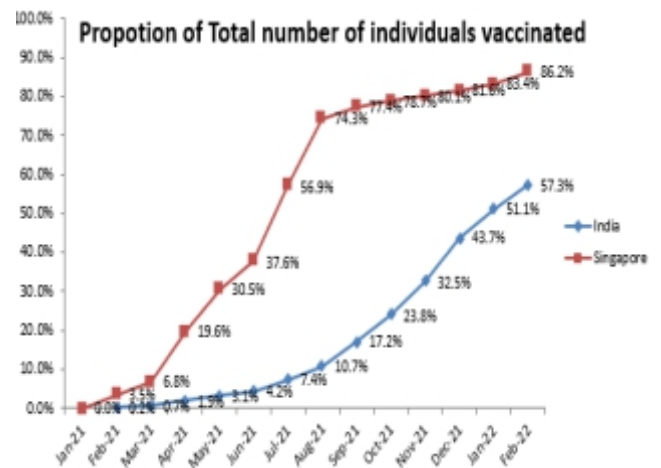


Figure 2:

Comparison of individuals fully vaccinated in India and Singapore with in a period of 12 months

Percentage of individuals with at least one dose of vaccination

	<i>Individuals with at least one dose of vaccination in India</i>	<i>Proportion of individuals with at least one dose of vaccination</i>
Jan-21	3,758,843.00	0.27%
Feb-21	11,845,075.00	0.86%
Mar-21	55,783,201.00	4.04%
Apr-21	125,376,952.00	9.09%
May-21	167,191,085.00	12.12%
Jun-21	271,410,023.00	19.67%
Jul-21	359,820,313.00	26.07%
Aug-21	497,002,083.00	36.01%
Sep-21	648,949,043.00	47.03%
Oct-21	733,542,729.00	53.16%
Nov-21	789,054,196.00	57.18%
Dec-21	845,640,601.00	61.28%
Jan-22	940,755,706.00	68.17%
Feb-22	965,733,580.00	69.98%

Figure 3

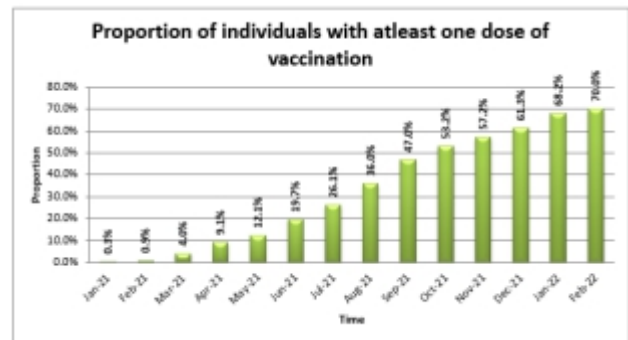


Figure 4

Percentage of individuals with at least one dose of vaccination within a period of 12 months

Male Vs Female proportion

When the percentage of vaccinated male and female proportions were assessed, they are having similar proportions with a small rise in percentage of males,

	<i>Total vaccination doses: females</i>	<i>Proportion of total vaccination doses: females</i>	<i>total vaccination doses: males</i>	<i>Proportion of total vaccination doses: females</i>
Jun-21	152,704,982	23.04%	177,709,820	24.78%
Jul-21	212,984,558	32.13%	242,580,880	33.83%
Aug-21	306,900,106	46.30%	342,149,261	47.71%
Sep-21	421,278,735	63.55%	457,925,540	63.86%
Oct-21	511,856,573	77.21%	547,167,044	76.30%
Nov-21	601,861,689	90.79%	634,918,824	88.54%
Dec-21	707,560,470	106.74%	739,804,186	103.17%
Jan-22	805,634,528	121.53%	840,526,660	117.21%
Feb-22	859,234,531	129.62%	897,055,303	125.09%

2020, the sex ratio of the total population in India is 108.18 males per 100 females. There are 7,100,970 or 717.10 million males and 662,903,415 or 662.90 million females in India. The percentage of the female population is 48.04 percent compared to 51.96 percent male population.

Figure 5

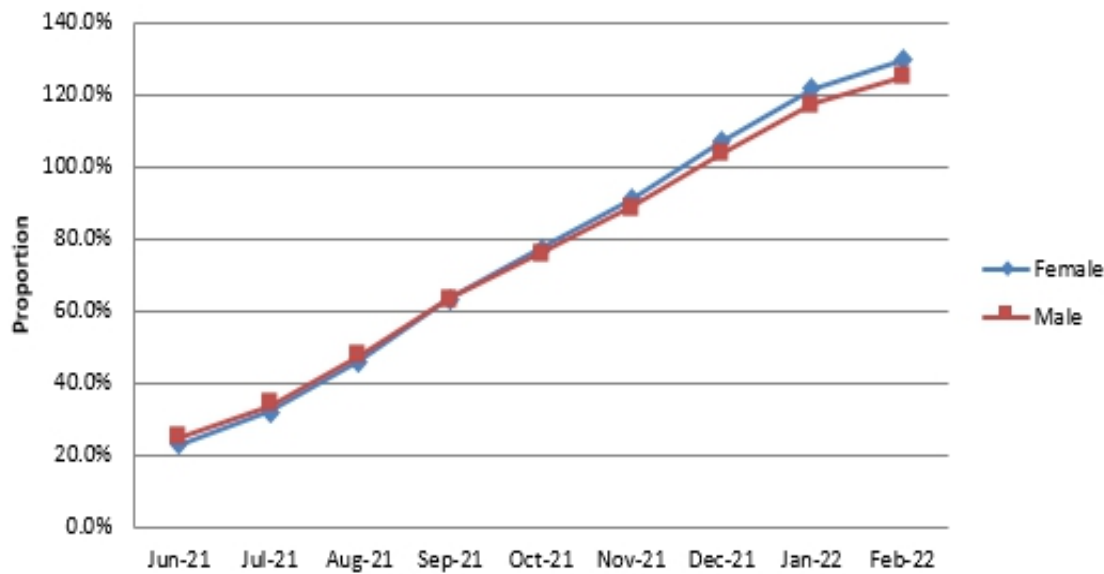


Figure 6
Comparison between Male and Female proportion vaccinated in India

Age groups

The proportion of vaccinated individuals in the age group of 18-44, 44-60, and above 60 were compared, among this, the percentage of vaccinated individuals are considerably higher in the 18-44 age group.

	total vaccination doses: age group 18-44	percent	total vaccination doses: age 44-60	percent	total vaccination doses: age above 60	percent
June 21	121704548	11.5917	115368470	29.40374	93397838	38.27749
July 21	190304544	18.12548	153423695	39.10281	111921915	45.86926
August 21	317230672	30.21452	198200104	50.51488	133753889	54.81671
September 21	475058315	45.24675	246397685	62.79891	157943346	64.73034
October 21	598812496	57.03367	282892069	72.10016	177557307	72.76879
November 21	723179791	68.87899	317599646	80.94602	196284398	80.44376
December 21	872434736	83.09472	357344219	91.07564	217924103	89.31242
January 22	1021121432	97.25633	387232114	98.69311	237807642	97.46134
February 22	1049928011	100	392359811	100	244002019	100

Figure 7

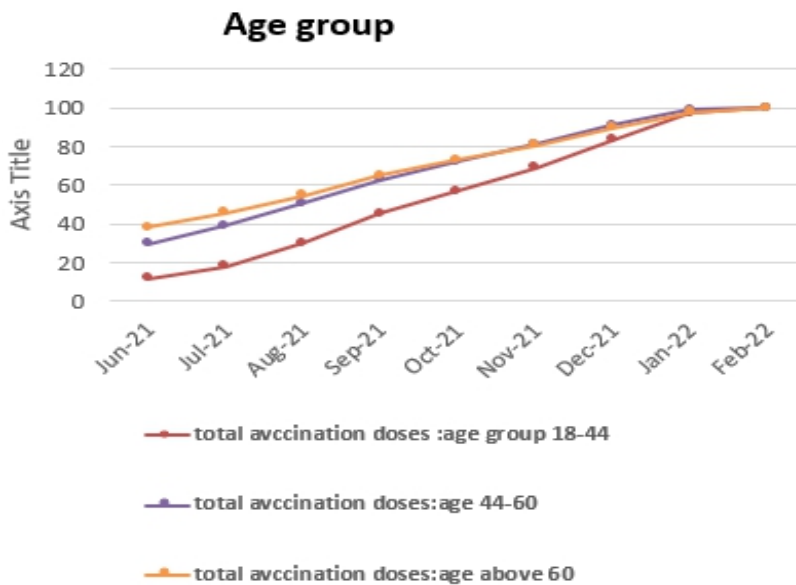


Figure 8 : The proportion of vaccinated individuals in the age group of 18-44, 44-60, and above 60

Discussion

In a second largest populated country like India, vaccine production itself is the biggest challenge and initially started off its vaccine drive in a slow pace and from August 2021 picked up speed, within 12 months around 70% of the population got at least one dose of vaccination.

Conspiracy theories that date back to the start of the COVID-19 pandemic have the potential to lower vaccination rates³. Hesitancy and resistance are already being encouraged by the anti-vaccination movement. Therefore, the World Health Organization (WHO) suggests a pro-vaccination approach that can enhance the vaccine uptake^{5,6}.

Mass gathering in health care units, hesitancy towards vaccination especially in rural areas, lack of research facilities, and also, initially there was a plan to involve private sectors, which was changed later on as the cost involved was not affordable. We can overcome these challenges by focusing on vaccine production and minimizing the intervals between 2 doses, door-to-door vaccination programs to avoid mass gathering, and can also impart training for base-level health care workers.

According to Fine PE7 et al (1993), the term "herd immunity" describes the indirect protection provided to susceptible people when sufficiently high percentage of people in a population are immune to a certain infection.

According to Kissler⁸ et al. Protection against reinfection

with coronavirus species tend to diminish with time. The proportion of the population that must receive vaccinations to accomplish this varies depending on how contagious the target pathogen is. The percentage of the population that needs to be immunized to achieve this varies with the infectivity of the target pathogen. So, the threshold for vaccination-induced herd immunity is pathogen-specific⁹.

Herd immunity threshold' level in the Indian population was calculated as 75 percent (Jadabeswar et al). According to the most basic formula, R_0 (also known as "R naught" and denoting basic reproduction number, which is the typical number of secondary infections caused by a single infectious individual introduced into a completely susceptible population) determines the development of herd immunity in the Covid19 novel virus. The proportion of the population to be infected to stop the spread of an infectious illness, as in the instance of the Covid19 pandemic, is known as the "herd immunity threshold" and is mathematically expressed by the formula = $[1 - 1/R_0]$ ¹⁰.

In the initial stage, researchers assumed that a significant amount of the population who have survived the disease must have achieved immunity against the virus. There can then high chance of the Indian population reaching their herd immunity threshold.^{11,12}

India took 12 months to get a vaccination coverage of 70% which was considered as a stage where we can

achieve herd immunity but now due to the development of various strains and reinfection, researchers are skeptical about herd immunity and we have to wait till the pandemic to end, to get a proper evaluation about herd immunity.

Conclusion

With India's current vaccination strategy, we achieved 70% of vaccination coverage within 12 months. Even though there were some initial issues regarding the vaccination strategy and hesitancy from the public, the pace of the vaccination program has increased since August 2021. Initially, it was assumed that India would reach herd immunity when around 75% of the population get immunized. But now due to various reasons researchers are not able to arrive at a conclusion regarding the concept of herd immunity in covid 19 infection. However, there may be another pandemic outbreak at any time. So our health care system should be strengthened at all levels to face it. The data provided in this study may help in rectifying all the challenges that we have faced and we can tackle future pandemic outbreaks more effectively.

Conflict of interest: None

Source of support: Nil

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