

## Comparison of Covid-19 Infection amongst Vaccinated and Non-Vaccinated Health Care Workers at Alexis Hospital, Nagpur - A Preliminary Report

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### ABSTRACT

**Introduction :** There is lack of data on the effectiveness of Covishield amongst health care workers in India till now. The present study was conducted to assess & compare the rate of incidence of Covid-19 infection amongst vaccinated and non-vaccinated health care workers at Alexis Multispecialty Hospital, Nagpur.

**Methodology :** The participants were broadly divided into two groups- 1. Those who received Covid-19 Vaccine (2 doses) - Vaccinated and 2. Those who did not receive Covid-19 Vaccine (2 doses) - Non-Vaccinated. Intergroup comparisons were drawn for incidence of infection, hospitalization and severe disease and results assessed for statistical significance.

**Results :** The Covid-19 infection rate was observed to be significantly lower in 'Vaccinated' group (65/928, 7.00%) in comparison to 'Non-vaccinated' group (24/140, 17.14%). The hospitalization rate was significantly lower in 'Vaccinated' group (2/928, 0.22%) in comparison to 'Non-vaccinated' group (19/140, 13.57%). There was no case of severe Covid-19 disease amongst those 'vaccinated', as against 3 (2.14%) severe cases amongst those 'non-vaccinated'.

**Conclusion :** The population having completed two doses of vaccine are at low risk of development of infection by Covid-19 as against those having received either one or none dose of the vaccine. The vaccine hence is strongly recommended for preserving the workforce.

**Keywords :** Covid-19, vaccine, Covishield, Health care workers

### Introduction :

The last year & half has been very difficult and has posed unprecedented hardships; professionally for the medical fraternity, personally for few of us and collectively for the human race as a whole. But it has also been a year wherein the researchers have lived up to the challenge in terms of vaccine development, among other things, leading to as many as 94 vaccines being currently tested in clinical trials on humans with 32 having reached the final stages of testing as on date, with a good chunk reporting more than 90% efficacy against Covid-19.<sup>1</sup> Amongst other vaccines, encouraging efficacy results were reported in The Lancet : investigators of four randomised, controlled trials conducted in the UK, South Africa, and Brazil reported pooled results of

an interim analysis of safety and efficacy against COVID-19 of the OxfordAstraZeneca chimpanzee adenovirus vectored vaccine ChAdOx1 nCoV-19 (AZD1222) in adults aged 18 years and older.<sup>2</sup> This prompted the Government of India to grant emergency use authorisation for Oxford-AstraZeneca vaccine, which is being manufactured and marketed in India by Serum Institute of India (SII) under the brand name of 'Covishield'.

Efficacy and effectiveness of vaccines measure the proportion of reduction of a disease among vaccinated persons. The difference is that efficacy is used during a clinical trial under ideal circumstances and effectiveness is used when a study is performed under everyday conditions outside of clinical trials.<sup>3</sup> To the best of our knowledge, there are no reported studies on the effectiveness of Covishield amongst health care workers in India till now, which can only be assessed by actually measuring the incidence of infection in those vaccinated.

The present study is an attempt to fill this lacuna via preliminary enquiry in to assessment & comparison of rate of incidence of Covid-19 infection amongst

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vaccinated and non-vaccinated health care workers at Alexis Multispecialty Hospital, Nagpur.

### Methodology :

The present study was conducted at Alexis Multispecialty Hospital, Nagpur (M.S.), which is a private tertiary health care organization. It was a prospective, observational study conducted from 29th January 2021 to 10th June 2021 (~ 5 months). All the health care workers (HCWs) (clinical, non-clinical) working at Alexis Multispecialty Hospital, Nagpur during the study period constituted the study population, out of which those HCW eligible for Covid-19 vaccination were enrolled for the study as participants (Study Sample). In all, a total of 1068 participants were thus recruited and were part of final analysis.

The participants were broadly divided into two groups and inter-group comparisons drawn :

1. Those who received Covid-19 Vaccine (2 doses) - Vaccinated
2. Those who did not receive Covid-19 Vaccine (2 doses) - Non-Vaccinated

All the eligible HCWs were offered Covid-19 vaccination at Covid vaccination Centre (CVC) operational at the study site. Repeated communications towards information & sensitization of all the HCWs as beneficiaries for Covid-19 vaccination was done by the hospital administration before & during the CVC being operationalized. The vaccination at the CVC was conducted using 'Covishield' vaccine as per the requisite Ministry of Health & Family Welfare (MOHFW), Government of India guidelines. 'Covishield' is a recombinant viral vectored vaccine developed by the University of Oxford along with British pharmaceutical company AstraZeneca and manufactured in India by Serum Institute of India. It has been approved for emergency usage by the Government of India. Meticulous record of the vaccination beneficiaries was maintained both via Co-Win app as well as by the Infection Control Nurse. In case of suspicion or confirmation of Covid-19 infection, the concerned HCW was offered free diagnostic & therapeutic services (In-patient as well as Out-patient) by the hospital.

The outcomes were assessed as per following operational definitions :

- **Infection / Infected** : Symptomatic HCW (self-reported or picked up during screening) diagnosed to be positive on Antigen or RTPCR test for Covid-19. (For 'vaccinated' group, the HCW with symptom onset after 15 days from the date of 2nd dose were considered as being 'Infected').
- **Hospitalization** : Symptomatic infected HCW requiring In-patient care for management of Covid-19 infection/disease.
- **Severe Disease** : Symptomatic HCW requiring In-patient care in ICU setting with SPO2 level < 90% and requirement of > 6 litres per minute Oxygen for management of Covid-19 infection/disease.

The data were analyzed in descriptive statistics using MS Excel (Version 2019) and presented as numbers & percentages. The level of statistical significance was arbitrarily set at a P-value of <0.05.

### Results :

Out of total 1068 participant HCWs studied, 928 (86.9%) received 2 doses (Vaccinated) and remaining 140 (13.1%) did not receive 2 doses (Non-vaccinated; received either none or one dose) of Covid-19 Vaccine (Covishield).

The overall incidence rate of Covid-19 infection amongst Alexis Hospital HCWs till the completion of the study was 89/1068 (8.33%). The Covid-19 infection rate was observed to be significantly lower in 'Vaccinated' group (65/928, 7.00%) in comparison to 'Non-vaccinated' group (24/140, 17.14%), indicating comparatively significant protection being provided by vaccination against subsequent infection. (**Table 1**)

The hospitalization rate was significantly lower in 'Vaccinated' group (2/928, 0.22%) in comparison to 'Non-vaccinated' group (19/140, 13.57%). Also, the rate of hospitalization amongst those infected with Covid-19 was significantly lower in 'Vaccinated' group (2/65, 3.07%) in comparison to 'Non-vaccinated' group (19/24, 79.17%). (**Table 1**)

**Table 1 : Rate of Covid-19 Infection amongst Health Care Workers (HCWs)**

Sr. No.	Covid-19 Infection Amongst HCWs	Total no. of HCWs = 1068		P- Value
		Received Covid-19 Vaccine (2 doses) (n = 928)	Didn't Receive Covid-19 Vaccine (2 doses) (n= 140)	
1	Infection Rate	65 (7.00%)	24 (17.14%)	<0.05
2	Hospitalization Rate	2 (0.22%)	19 (13.57%)	<0.05
3	Hospitalization amongst Infected	2/65 (3.07%)	19/24 (79.17%)	<0.05
4	Rate of Severe Disease	0	3 (2.14%)	<0.05

There was no case of severe Covid-19 disease amongst those 'vaccinated', as against 3 (2.14%) severe cases amongst those 'non-vaccinated'; the difference between the groups being statistically significant. (**Table 1**)

No case of mortality was observed amongst HCWs in either of the groups during the study period.

#### **Discussion :**

There are many studies conducted across the globe depicting effectiveness of Oxford-AstraZeneca vaccine in general population. The strong notion that vaccines reduce hospitalization and risk of severe disease in fact remains unequivocal & should be considered well established. However, skepticism about vaccine effectiveness started growing as soon as multiple variants started driving the pandemic across different countries. Closer to home, the current second wave of Covid-19 started in India during second week of February at Nagpur (Maharashtra) and adjoining area. It was observed that this time higher proportion of younger patients had started coming in with severe hypoxia and irreversible lung fibrosis. Genomic sequencing finally concluded that the virus circulating in most parts of the country by that time was actually a new variant b.1.617.2, which was later named as delta variant by the World Health Organization (WHO).<sup>4</sup> The need of rapid, large scale vaccination drive with an effective vaccine was imminent. But the locally relevant real world data with respect to effectiveness of widely available 'Covishield' was limited, leading to much skepticism, especially amongst health care workers; further underlining the need of

study like the present one.<sup>5,6</sup> During the same period, our healthcare workers were being inoculated for their first and second dose with Covishield, thankfully with commendable confidence.

The primary observation in the cohort of healthcare workers studied in the present study indicated Oxford-AstraZeneca vaccine (Covishield) to be highly effective against symptomatic Covid-19 infection among HCWs. Effectiveness of a complete 2-dose regimen of these vaccines was estimated to be 93%, consistent with the findings from the original clinical trials.<sup>2,7</sup> We have had around 7% of healthcare workers develop breakthrough infections in spite of second dose of vaccine. Most of these infections were mild though, except 2 healthcare workers (3.07%) who had persistent fever and needed hospitalization. However, their CT severity scores were less than 8 and they never required oxygen. 79% of the infected non vaccinated healthcare workers required hospitalization due to persistent fever and CT changes. This number appears disproportionately high; which has much to do with our threshold for hospitalization for HCW being relatively lower. All these HCW had persistent high-grade fever beyond day 5 of symptom onset and developed CT changes within 8 days of illness (CT severity > 5). Three (2.14%) non-vaccinated HCWs developed severe disease. Two out of these 3 HCWs were pregnant females who developed severe disease, hypoxia and needed NIV and prolonged hospitalization, prompting us to suggest vaccination in pregnant females, a recommendation which has now been approved and incorporated in the Covid Vaccination

Program by the government of India.<sup>10</sup> Nobody in the vaccinated group developed hypoxia, progression of disease to severe stage or disease relapse.

Based on our data, there are reasons to believe that current delta variant is still not resistant to vaccines. Our study may actually be considered testament to the fact that vaccines work against delta variant as well, as this was invariably the dominant strain across India during the study period. This has been further corroborated after similar reports have been published from the UK as well.<sup>8,9</sup> It is agreeable though, that any further extrapolation & interpretation without conclusive evidence may be unscientific. Further, the urgent public health need to disseminate the locally sourced, statistically significant & clinically relevant evidence with respect to Covid-19 vaccine effectiveness compelled us to proceed expeditiously with the available data as a preliminary report without getting into required sub-group analyses (especially with respect to the non-vaccinated group- one dose versus no dose) for further insights, which as such remains one major limitation of the study.

It can be said in conclusion that the population having completed two doses of vaccine are at low risk of development of infection by Covid-19 as against those having received either one or none dose of the vaccine. The vaccine hence is strongly recommended for preserving & keeping the workforce healthy to fight another day in these difficult times.

**Conflict of Interest :** None declared

**Funding Sources :** Covishield made available by the local government authorities free of cost

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