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Estimation of Effectiveness of the Covishield Vaccine

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Abstract

Corona viruses is RNA virus, and classified within the Coronaviridae family and falls under the Nidoviridae family. Its significance as a public health concern escalated following the outbreak of Severe Acute Respiratory Syndrome Corona virus (SARS-CoV) in the city of Wuhan, Hubei Province, China, in December 2019. Following the notification of the index case in China, the first confirmed case of CoViD-19 was reported in January 2020 in India. Effectiveness of corona virus disease-19 (COVID-19) vaccines used in India is unexplored and need to be substantiated. In the meantime, serum institute of India, Pune starts the chase for the vaccine and by the end of the year, they come along with the Covishield (Oxford/Astra Zeneca vaccine manufactured by Serum Institute of India) vaccine. Studies describing the effect of the Covishield vaccine are scars. The objective of the study was to find the effectiveness of the Covishield vaccine. In this study we included the RT-PCR confirmed 328 Covid infection hospitalised patients, from January 2021-June 2021 (includes Frontline workers, Police staff, Teachers and Elderly etc.), from age group 20-75, who were admitted in Goberdhan Tiwari Base Hospital Almora Uttarakhand along with their vaccination status. In vaccinated group of 117 individuals 104(88.88%) were recovered from hospitalisation but in the non-vaccinated group of 211 individuals 110 (52.13%) were recovered and 101 (47.87%) were deceased. We concluded that Vaccinated individuals recover rapidly as compared to the non-vaccinated individuals.

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Key Words

COViD-19, covishield, health care workers (Hcw), vaccine effectiveness, vaccine efficacy

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INTRODUCTION

The corona virus, classified as an RNA virus belonging to the Coronaviridae and Nidoviridae families, has garnered increased attention as a significant public health concern. This heightened awareness can be traced back to the emergence of the Severe Acute Respiratory Syndrome Corona virus (SARS-CoV) in Wuhan, Hubei Province, China, in December 2019. The first documented case of COVID-19 in India was officially reported in January 2020, subsequent to the identification of the initial case in China[1]. The global response to the COVID-19 pandemic has spurred scientists worldwide to develop vaccines targeting the SARS-CoV-2 virus. Vaccination stands out as a safe and cost-effective public health intervention against infectious diseases. Initially, our reliance was primarily on implementing robust infection control measures and symptomatic approaches due to the absence of effective antiviral therapy and vaccines to mitigate transmission. As of late 2020, only three projects focused on attenuated SARS-CoV-2 vaccines were actively undergoing preclinical development, with contributions from the Serum Institute of India collaborating with Codagenix, a New York-based private biotech, Indian Immunologicals Ltd. in partnership with Griffith University, Australia and Mehm *et al*. i Aydunar University in Turkey[2]. India initiated the COVID-19 vaccination campaign on January 16, 2021, employing a phased approach. The initial focus was on vaccinating healthcare workers (HCWs) and other frontline workers, followed by the prioritization of individuals aged over 60 and those aged 45-60 with comorbidities. Subsequently, the program expanded to include all individuals aged 45 and above and eventually, vaccinations were made available to all adults. Covishield was the first vaccine introduced in India and currently, there is a notable absence of studies evaluating the specific effectiveness of the COVID vaccine, particularly Covishield. Various factors influencing vaccine effectiveness are outlined in the accompanying image[3]. So, we plan to conduct this study to check the effectiveness in vaccinated and non-vaccinated covid-19 patients.

MATERIAL AND METHODS

An observational prospective cross-sectional study was conducted from January 2021-June 2021 at Gobardhan Tiwari Base Hospital (Covid Care Centre during the Pandemic) and Soban Singh Jeena Government Institute of Medical Sciences, Almora Uttarakhand in the Department of Pharmacology and Respiratory Medicine. Study includes the RT-PCR confirmed, 328 hospitalised patients of the covid infection, while taking all necessary covid safety precautions, a format which includes patient particulars and the vaccination status was filled by the nursing staff and submitted at the reception desk for every hospitalise patient in the Covid ward. This format includes the vaccination status and informed written Consent statement of the patient. Both male and Female were included. There was no exclusion criterion applied because at that time no correlation with comorbidities were established. Covishield vaccine was given to the elderly more than 60 yrs and healthcare worker initially from January to march 2021 and then from April 2021 adults of age group 20-45 were vaccinated. Patients <18 years of age were excluded as they were not vaccinated by 2022. A contingency table was prepared and evaluated accordingly. The study does not include any direct intervention to the patient so ethical clearance waived off and an informed consent was taken during the hospitalisation of the patient by Nursing In-charge.

RESULTS AND DISCUSSIONS

Out of 328 individuals 134 (40.85%) were females and 194 (59.15%) were male. The average age was found to be 52±16 years. The average age for male was 60±15 and for female was 58±13. Out of 328 individuals 117 were vaccinated for Covishield vaccine which is 35.67% and 211 individuals (64.33%) were not vaccinated. Out of 117 vaccinated individuals 67 (57.26%) were male and 50 (42.74%) were females, represented in (Graph 1).

Out of 117 patients in the vaccinated group 104 (88.88%) patients were recovered from Covid and 13 (11.12%) patients died due to Covid illness. Out of 211 patients in the non-vaccinated group 110 (52.13%) patients recovered and 101 (47.87%) patients died due to covid illness. As shown in (Graph 2).

The effectiveness of Covishield vaccine in the studied population is shown in contingency table 1 below with Sensitivity, Specificity and Odds Ratio.

- Sensitivity for the Covishield vaccine in vaccinated group is 48.5%, indicating that the Covishield vaccine is effective in 48.5% of individuals who had recovered from the disease
- Specificity for the non-vaccinated group is 88.5%, signifying that the absence of vaccination was accurately identified in 88.5% of individuals who died due to covid
- The calculated odds ratio is 7.83, suggesting a substantial association between Covishield vaccination and recovery from the disease

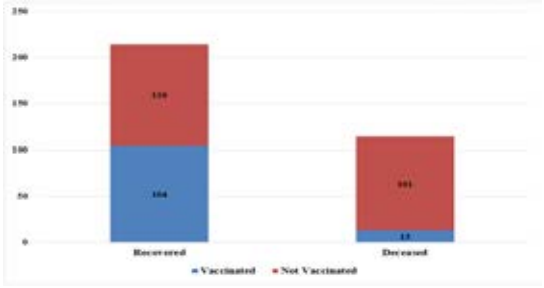
These findings highlight the effectiveness of Covishield vaccination in recovery from the Covid disease. The notable odds ratio underscores a strong association between vaccination and recovery. These results contribute valuable insights into the

effectiveness of Covishield in the studied population.

The Indian government has taken unprecedented steps to authorize the emergency use of two COVID vaccines, aiming to control the pandemic and its diverse mutated variants. Despite this, a literature review reveals a gap in real-world comparisons of patient profiles among non-vaccinated, partially vaccinated and fully vaccinated COVID-19 patients. Our study addresses this gap by examining hospitalised COVID-infected patients with vaccinations, revealing their successful recovery even in the presence of comorbidities. Moreover, the improvement in oxygen saturation among hospitalized patients with comorbidities was notably superior compared to non-vaccinated counterparts with similar health conditions. Beyond the immediate context, the implications for public health encompass cost-effective protection, reduced illness severity and an effective intervention to break the transmission chain-highlighting the potential benefits of widespread vaccination efforts. Our study concludes with an odds ratio of 7.83, providing a robust statement on the efficacy of the vaccine within the vaccinated group. A similar study by Contractor A *et al*.[4] reveals that full vaccination significantly lowered the infection rate, especially in cases of severe infection among healthcare personnel, even amidst the challenging delta wave in the country. Furthermore, for those who did contract the virus, the rates of hospitalization were minimal, with no reported fatalities. These results validate our results as we reported the specificity of vaccine is 88.5%. In a study from Jerusalem, Benenson S, *et al*.[5] reported that the infection occurred over 2 months in 366 (6.9%) of 5297 vaccinated HCW and 213 of 754 unvaccinated individuals. These results are in accordance with our findings. In a similar study conducted at Christian Medical College, Vellore, a 2600-bed tertiary care hospital in India with a workforce of 10,600 employees, a total of 8991 staff members were vaccinated between January 21, 2021, and April 30, 2021. The majority of employees (8394 [93.4%]) were administered Covishield, which is the Oxford-AstraZeneca vaccine manufactured by the Serum Institute of India. Victor P.J *et al*.[6] reported among 7080 fully vaccinated HCWs, 679 (9.6%) had development of infection. The risk of infection among fully vaccinated HCWs was substantially lower when compared with unvaccinated HCWs. These results validate our findings. Leveraging information from 360 case-control pairs, Pramod S. *et al*.[7] presented findings in their study on the Vaccine Effectiveness of one dose and two doses in offering protection against Covid-19, indicating rates of 49% (95% CI: 17%-68%) and 54% (27%-71%), respectively. Notably, for cases involving moderately severe disease necessitating oxygen therapy, the Vaccine Effectiveness following any number of vaccine doses was reported as 95% (44%-100%) and they concluded that Covishield vaccine protects significantly against Covid-19, with a higher protection rate against severe forms of disease these findings are in accordance with our findings as our study cohort includes moderately to severely ill hospitalised patients of Covid infection and our results also demonstrated that the recovery of hospitalised patients were faster in vaccinated group. A similar cohort study from the eastern states of India at AIIMS Patna Singh C. *et al*.[8] found vaccine effectiveness to be 45.0% (95% CI 30.0-56.0) in the partially vaccinated group and 77.0% (95% CI 65.0%-84.0%) in the fully vaccinated group in preventing SARS-CoV-2 infection. After adjusting with potential confounders like age, sex, occupation, COVID-inappropriate behavior score, chronic co-morbidity, H/O hospitalisation for chronic co-morbidity, ILI, past COVID-19 infection and high-risk contact with a COVID-19 case or suspect, the vaccine effectiveness for partial and full vaccination were estimated to be 52.0% (95% CI 39.0-63.0%) and 83.0% (95% CI 73.0-89.0%), respectively. In our study vaccine effectiveness is found to be 48.5% of individuals who had recovered and 88.5% of individuals who were not vaccinated got deceased due to covid infection. These

Fig. 1: Image: Factors affecting vaccine effectiveness

Graph 1: Distribution of Vaccination status



Graph 2: Distribution of the Recovered and Deceased against Vaccination status

Table 1: Contingency table with odds ratio

Parameters	Recovered(214)	Deceased(114)	
Vaccinated with Covishield	104	13	Odds ratio
(117)			7.83
Not vaccinated with Covishield (211)	110	101	
Total (328)	Sensitivity 48.5	Specificity 88.5	

findings are in accordance with our study results. These findings strengthen the data regarding the vaccine effectiveness specifically Covishield (Oxford/Astra Zeneca vaccine manufactured by Serum Institute of India). In a similar report by the Public Health Department of England the early impact and effectiveness of COVID-19 vaccination was reported in March 2021: vaccine effectiveness against death and hospitalization[9]. A similar result is also reported in the Randomized controlled trial in 2020 including 21 977 adults who have reported vaccine efficacy to be 91·6% (95% CI 85·6-95·2)[10]. A similar study reported an acceptable safety profile of Covishield vaccine and has been found to be efficacious against symptomatic COVID-19 in this interim analysis of ongoing clinical trials[11]. Another study reported that the vaccine showed 94.1% efficacy at preventing Covid-19 illness, including severe disease related to Covid-19[12]. These findings ate in accordance with our results. In a study from India, it is reported that the chest CT score of vaccinated individuals are good as compare to non-vaccinated patients[13]. Through a comprehensive examination of adults aged 65 years and older across multiple states, the administration of an authorized COVID-19 vaccine was linked to substantial protection against hospitalization due to COVID-19. The effectiveness was notably high, reaching 94% for fully vaccinated adults and 64% for those partially vaccinated (i.e., onset of COVID-like illness =14 days after the first vaccine dose in a 2-dose series but <14 days after the second dose). These results align with the efficacy observed in our study[14]. One more study found out that the vaccination was associated with a reduced risk for COVID-19–associated hospitalization which validates our results[15].

CONCLUSION

COVID-19 vaccine Covidshield was found to be very effective in infection prevention, decreases the duration of hospital stay and found to be effective in decreasing the mortality in severe form of covid infection.

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Conflict of Interest: Author declares no conflict of interest.

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