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Short Communication

Covid-19 vaccine breakthrough infections amongst health care workers in a tertiary care centre

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ABSTRACT

Objectives: The study was conducted to understand the clinical profile of Covid-19 infections amongst health care workers after vaccination**Materials and Methods:** SARS CoV 2 infection was diagnosed with Antigen test / Automated RTPCR in health care workers. All health care workers presenting with symptoms related to Covid-19 atleast 2 weeks after receiving ChAdOx1 nCoV-19 vaccine or high risk primary contacts with asymptomatic infection were included in the study. Detailed clinical profile and other data were collected using a proforma.**Results:** 82.1 % of the Covid 19 infections after vaccination were defined as Mild Covid-19 and received supportive care at home. Breakthrough infections occurred after a mean duration of 31 days. Since fever and throat pain were the most common presenting symptoms (71.4% and 39.3%), upper respiratory infection was considered as more common. Only 3 patients were defined as Moderate Covid 19 which required hospitalization but did not require oxygen supplementation.**Conclusions:** Breakthrough infections after ChAdOx1 nCoV-19 vaccination were mild in majority of the cases and most cases presented with upper respiratory tract infection symptoms. The pattern of breakthrough infections helps in determining the efficacy of vaccines and requirement of booster doses of vaccine.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

1. Background

Vaccination forms a critical part of multi-faceted public health response against pandemics like the current one caused by the novel SARS CoV 2 virus. Accelerated research and development has resulted in availability of various vaccines for the infection and corresponding efficacy studies have been published. ChAdOx1 nCoV-19 (Recombinant Chimpanzee Adenovirus vector vaccine encoding the SARS-CoV-2 Spike glycoprotein, University of Oxford, AstraZeneca and the Serum Institute of India) and BBV152 vaccine (Bharath Biotech and Indian Council of Medical Research) are widely available in India.¹

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ChAdOx1 nCoV-19 has an acceptable safety profile and was reported to have an overall efficacy of 70.4 %.² The vaccination drive in India started in a phased manner according to the National Expert Group on Vaccine Administration for COVID-19 (NEGVAC), starting with health care workers followed by elderly greater than 65yrs of age.³ Hence, breakthrough infections were first reported amongst health care workers.

2. Materials and Methods

The study was conducted in Iqraa International hospital and Research Centre, a large tertiary care centre in Kerala, India. Covid-19 vaccination for health care workers commenced on 25th January 2021 in our hospital. The study was

initiated on 1st April 2021, approximately 2 months after the vaccination drive was launched. Data was collected for the following 2 months. Breakthrough infections were defined as symptoms related to Covid 19 infection atleast 2 weeks after 2 doses of vaccination. Those who developed symptoms atleast 2 weeks after 1 dose of vaccine were also included in the study.

2.1. Specimen collection and Processing

All vaccinated symptomatic as well as high risk contact health care workers were subjected to Covid 19 testing by Antigen test or Automated RTPCR. Symptomatic individuals who tested antigen negative were further tested by RTPCR. Nasopharyngeal and oropharyngeal swabs were collected in Viral transport medium and processed by automated extraction and amplification according to manufacturer's instructions and interpreted accordingly. The assay amplifies E gene and Covid19 specific target Orf1a, thus being a confirmatory test.⁴

2.2. Data collection

History of vaccination as well as symptom profile was collected using a proforma. Comorbidities were also noted. Asymptomatic infection was defined as individuals who test positive for SARS-CoV-2 using a virologic test (i.e a nucleic acid amplification test [NAAT] or an antigen test) but who have no symptoms that are consistent with COVID-19. Mild illness was defined as individuals who have any of the various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but do not have shortness of breath or abnormal chest imaging. Individuals who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation (SpO_2) $\geq 94\%$ on room air at sea level were included in moderate illness. Severe illness was defined as individuals who have $SpO_2 < 94\%$ on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO_2/FiO_2) < 300 mm Hg, respiratory frequency > 30 breaths/min, or lung infiltrates $> 50\%$.⁵

3. Results and Discussion

A total number of 28 health care workers developed Covid 19 infection after vaccination during April- May 2021. Mean age of infected individuals was 24 years and majority (89)% were females. Among these, 9 individuals had received only 1 dose of vaccine whereas 19 fulfilled the criteria for breakthrough infection as symptomatic infection after 14 days of completing 2 doses of vaccine. Asymptomatic infection was diagnosed in 2 health care workers, 1 person had received single dose and the other got 2 doses of vaccine. Covid-19 infection after 1 dose of vaccine was observed after a mean duration of 54.5 days,

whereas breakthrough infection after 2 doses had a mean duration of 31 days.

No comorbidities were observed in the study population. Fever was noted in 71.4% of affected individuals whereas cough was present in only 28.6 % and 39.3 % had throat pain. Only 3 individuals experienced breathing difficulty and required hospitalization but oxygen saturation was maintained above 94%. 82.1% of the infections were defined as Mild Covid-19 and received supportive care at home. Moderate Covid 19 was observed in 3 health care workers and required hospital admission, among whom 2 persons had received both doses of vaccine. There was no severe illness or mortality reported.

Previous studies have also reported that majority of breakthrough infections are mild.^{6,7} Beena et al and Moriah et al have reported genomic survey of breakthrough infections among health care workers in Kerala and Israel respectively.^{8,9}

4. Conclusion

Breakthrough infections as well as infections after single dose of ChAdOx1 nCoV-19 vaccine were mild in majority of the cases and most cases presented with upper respiratory tract infection symptoms. The study has limitations like it includes only young healthy individuals with no comorbidities and small sample size. Further large scale research is required for determining efficacy of vaccines in regional settings and determining the requirement of booster doses.

5. Conflict of Interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

6. Source of Funding

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References

1. Ministry of Health and Family Welfare, Government of India. Information Regarding COVID-19 Vaccine. Available from: https://www.mohfw.gov.in/covid_vaccination/vaccination/index.html.
2. Voysey M, Clemens SAC, Madhi SA, Weckx LY, Folegatti PM, Aley PK, et al. Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *Lancet*. 2021;397(10269):99–111. doi:10.1016/S0140-6736(20)32661-1.
3. Ministry of Health and Family Welfare (2020) COVID-19 Vaccine Operational Guidelines, 28 December 2020. Available from: <https://main.mohfw.gov.in/sites/default/files/COVID19VaccineOG111Chapter16>.
4. Retrieved from . Available from: https://www.molbiodiagnostics.com/uploads/product_download/20200813.163414~Truenat-Beta-Coronavirus-packinsert.pdf.
5. COVID-19 Treatment Guidelines Panel. Coronavirus Disease 2019 (COVID-19) Treatment Guidelines. National Institutes of Health.

<https://www.covid19treatmentguidelines.nih.gov/> Accessed 4/8/21. 2019;.

6. Niyas VKM, Arjun R. Correspondence: Breakthrough COVID-19 Infections among Health Care Workers after Two Doses of ChAdOx1 nCoV-19 Vaccine. *QJM*. 2021;114(10):757–8. doi:10.1093/qjmed/hcab167.
7. Tyagi K, Ghosh A, Nair D, Dutta K, Bhandari PS, Ansari IA, et al. Breakthrough COVID-19 infections after vaccinations in healthcare and other workers in a chronic care medical facility. *Diabetes Metab Syndr*. 2021;15(3):1007–8. doi:10.1016/j.dsx.2021.05.001.
8. Philomina JB, Jolly B, John N, Bhoyar RC, Majeed N, Senthivel V, et al. Genomic survey of SARS-CoV-2 vaccine breakthrough infections in healthcare workers from Kerala. *India J Infect*. 2021;83(2):237–79. doi:10.1016/j.jinf.2021.05.018.
9. Bergwerk M, Gonen T, Lustig Y, Amit S, Lipsitch M, Cohen C, et al. Covid-19 Breakthrough Infections in Vaccinated Health Care Workers.

N Engl J Med. 2021;385(17):1630–1. doi:10.1056/NEJMc2113497.

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