



Covid 19 Infection in Vaccinated Healthcare Workers: A Tertiary Care Hospital Experience

Kaya SD* and Kizmaz YU

University of Health Sciences Kartal Kosuyolu Research and Training Hospital, Infection Disease, Istanbul/Turkey

*Corresponding author: Kaya SD, University of Health Sciences Kartal Kosuyolu Research and Training Hospital, Infection Disease, Istanbul/Turkey; Tel: +90(505)6770069; E-mail: sibeldogankaya@yahoo.com

Abstract

Introduction: The COVID-19 global pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) began in December 2019 in Wuhan, China and has spread worldwide. Healthcare workers play a key role in this pandemic to provide ongoing care for large numbers of COVID-19 patients. Frontline healthcare personnel are 3.4 times more likely to become infected than the general population. In this study, it was aimed to determine the pre- and post-vaccine infection rates in healthcare workers of a 3rd level training and research hospital.

Material and Method: There are a total of 1582 healthcare workers in our hospital. There are 356 doctors, 689 nurses, 34 technicians, 207 cleaning personnel, 262 medical secretaries and 34 security personnel. In the diagnosis of acute infection it is recommended to demonstrate the presence of viral RNA in respiratory tract clinical samples (nasopharyngeal swab, tracheal aspirate, Broncho alveolar lavage, sputum) by real-time reverse transcriptase-polymerase chain reaction (rRT-PCR). The treatments were arranged according to the Covid 19 Guidelines of the Ministry of Health in accordance with the 2020 update. Covid 19 vaccination statuses were obtained retrospectively from the employee health data of our hospital.

Results: Between March 1 and September 1 2021, a total of 468 people were infected. Before Covid 19 vaccine came to our country, the infection of healthcare workers were 52 doctors, 150 nurses, 60 cleaning staff, 26 laboratory technicians, 20 medical secretaries and 9 security guards. After Covid 19 vaccine of healthcare workers, Covid 19 PCR test of 78 people was positive. After the dose, 73 people (52 women, 21 men) were positive for Covid 19 PCR for an average of 50.9 days. 1 doctor (7th days after 2 sinovac vaccine), 1 nurse (7th day after 2nd sinovac vaccine) were admitted to the Covid service. 42 UK variants detected; 7 physicians (all 2 doses vaccinated) infected on average 55 days (4 females, 3 males) after 2nd dose vaccination. South African variant was seen in 5 people. 3 nurses (3 females) were detected 35 days after the 2nd dose of vaccine, and 1 of 2 security personnel (1 female, 1 male) was detected 46 days after the 2nd dose of vaccination.

Conclusion: Healthcare workers are at high risk of exposure to coronavirus disease-2019 (COVID-19), with priority given to COVID-19 vaccine during the pandemic.

Keywords: COVID-19; Healthcare worker; Vaccine

Introduction

The virus is transmitted from person to person by droplet route and close contact, and after an incubation period of 5.2 days (2-14 days), it is often asymptomatic, but fever, cough, fatigue, shortness of breath, headache, sore throat, and runny nose, taste/odor it may progress with non-specific symptoms such as loss of sensation, diarrhoea, and haemoptysis [1,2]. The COVID-

19 vaccine is the most effective way to control the pandemic and there are different types of vaccines. As of January 13, 2021, Turkey granted emergency use permission to 'Corona Vac' produced by the Chinese biopharmaceutical company Sinovac. Corona Vac is a chemical developed against SARS-CoV-2 It is an inactivated vaccine [3,4]. Corona Vac was the only vaccine available in the country. More than a million healthcare workers (more than 95% of all healthcare workers) received their first

Received date: 11 December 2021; **Accepted date:** 17 December 2021; **Published date:** 24 December 2021

Citation: Kaya SD, Kizmaz YU (2021). Covid 19 Infection in Vaccinated Healthcare Workers: A Tertiary Care Hospital Experience. SunText Rev Virol 2(2): 125.

DOI: <https://doi.org/10.51737/2766-5003.2021.025>

Copyright: © 2021 Kaya SD, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

dose within a week. It started with healthcare workers on January 14, 2021. Vaccination was done with two doses of Corona Vac, 4 weeks apart.

Material and Method

The vaccination schedule is two doses of 3 mcg 28 days apart. Healthcare professionals had their second dose of vaccine administered in mid-February 2021 [5]. With the arrival of Biontech vaccine in our country on June 30, 2021, healthcare workers continued to be vaccinated (1 vial (0.45 ml) of 6 doses (each dose contains 30 micrograms of BNT162b2 mRNA in lipid nanoparticles). Descriptive statistics (mean, median, std. deviation, etc.) were used for continuous numerical variables in

the analysis. Categorical variables are expressed as numbers and percentages in frequency tables. Group distributions of categorical variables are shown in numbers and percentages using crosstab statistics. The statistical significance limit was taken as $p < 0.05$. SPSS 21 program was used for statistical analysis [6-8].

Results

A total of 1582 healthcare workers are in our hospital. There are 356 physicians, 689 nurses, 34 technicians, 207 cleaning staff, 262 medical secretaries, and 34 security personnel. Starting from March 1, 2020 until September 1, 2021, 468 people were infected (Tables 1,2).

Table 1: COVID 19 infection numbers by occupational group of healthcare professionals before Coronavac Vaccine.

	Total numbers	Mean ± Std. deviation
Length of stay	24	4,88 ± 2,82
Leukocyte count (×10 ³ /μl)	23	5615,22 ± 1825,54
Hemoglobin (gr/dl)	23	13,70 ± 1,26
Cytokine (pg/ml)	16	31,13 ± 26,91
Ferritin (ng/ml)	11	203,17 ± 138,50
AST (U/L)	23	29,39 ± 13,73
ALT (U/L)	23	32,74 ± 26,30
Creatinin (mg/dl)	23	1,75 ± 3,92
Trombosit (×10 ³ /μl)	23	228,70 ± 57,94
Neutrophil count (×10 ³ /μl)	23	64,95 ± 11,32
CRP (mg/lt)	23	23,63 ± 31,22
D-dimer (μg/lt)	23	0,39 ± 0,31
Fibrinogen (mg/dl)	6	436,67 ± 107,88
Glucose (mg/dl)	22	111,14 ± 30,33

Table 2: Laboratory parameters of unvaccinated personnel.

Occupation	Total numbers of vaccinated	SARS-CoV-2 PCR positivity before vaccinated
		n(%)
Physician	356	52 (%14)
Nurse	689	150 (%22)
Medical secretary	262	20 (%8)
Cleaning staff	207	60 (%29)
Technician	34	26 (%76)
Security	34	9 (%26)
TOTAL	1582	317(%20)

The situation where healthcare workers were infected with Covid 19 before being vaccinated was as follows: 52 doctors, 150 nurses, 60 cleaning staff, 26 laboratory technicians, 20 medical secretaries, 9 security guards. The hospitalization to the Covid 19 service in the hospital: 7 doctors, 8 nurses, 3 technicians, 2

medical secretaries, 3 cleaning staff. Treatments were arranged according to the Covid 19 guidelines of the Ministry of Health. After the vaccine has reached to country and health workers started to be vaccinated, due to Covid 19 infection: 1 physician and 1 nurse (7 days after the second dose of Corona vac vaccine)

were hospitalized. After vaccination was completed 78 people found Covid 19 PCR positive, 5 people after first dose of vaccine (4 females, 1 male) after an average of 78 days. After second dose, 73 subjects (52 women, 21 men) were Covid 19 PCR positive for an average of 50.9 days. We detected a total of 42 UK variants in healthcare workers at our centre; 7 physicians (16%) (All vaccinated with 2 doses) became infected for an average of 55 days (4 females, 3 males) after receiving the second dose vaccine. 1 resident was admitted to the doctor. Because of her involvement in computed tomography (CT) and oxygen saturation of 93%, fever and leukopenia. The UK variant was detected in 18 (42%) nurses. 8 of them had 2 doses vaccine. After an average of 59.2 days (7 females, 1 male), 5 technicians (12%); 2 technicians 2 people (2 females) who received the second dose of vaccination 34 days later, 3 medical secretaries (7%); 1 medical secretary after 2nd dose of vaccination (0 females, 1 male) after an average of 55.6 days, 2 security personnel (5%); 1 security personnel (31 days after 2nd dose, 7 cleaning personnel (18%) vaccinated; 4 persons (1 female 3 males) British variant infection was seen 70.2 days after the second dose of vaccine. South African variant was seen in 5 people. It was detected in 3 nurses (60%) (3 women) on average 35 days after the second dose of vaccination, and 46 days after the second dose vaccination in 1 of 2 security personnel (40%) (1 female, 1 male). Since the beginning of the pandemic, 25 healthcare workers (25%) were hospitalized. The most common complaint of 23 unvaccinated healthcare workers who tested positive for COVID-19 was flu-like symptoms such as fever, cough, headache, chills, sore throat and muscle pain in 11 (48%). tested for disease symptoms. Two people who were vaccinated were hospitalized. They were found to be British variants. No intensive care hospitalization or death was observed in the patients followed in the Covid 19 ward. The treatments were given in accordance with the current guidelines of the Ministry of Health [5]. In recent studies rate domestic transmission was found between 11% and 19% [6]. Domestic contact and traveling with a case with COVID-19 increase the risk of transmission 6-7 times higher compared to other forms of close contact. Sometimes, the transmission rate reaches 75% only in domestic contacts. In our study, the friend contact of the healthcare professionals working without knowing that they had Covid 19 was reported as 3 people.

Discussion

Healthcare workers working in hospitals constitute a high-risk group during the epidemic. Healthcare workers' risk of infection may increase during an ongoing outbreak due to a variety of factors, including continued exposure to patients, lack of personal protective equipment, and inadequate infection control training. During the 2003 severe acute respiratory syndrome (SARS) epidemic in Hong Kong, the first major cluster of transmission

occurred at the Prince of Wales Hospital, where healthcare workers accounted for a significant portion of the infection, with 43.6% of cases admitted to this hospital. Protecting healthcare workers from infection plays a crucial role in controlling hospital-acquired transmission. In addition, healthcare professionals were a reliable source of information about vaccines for patients [9]. In our country, 273,000 people had COVID-19 until September 2020, and it was announced that 29 865 of them were healthcare professionals [10-12]. In a phase 3 randomized controlled study conducted in 12 688 individuals in Brazil, 14 days after 2 doses of vaccination on days 0-14, it was reported that the vaccine's protection against symptomatic COVID-19 was 51% and protection against hospitalization was 100% [13]. In Turkey 0-14 in a phase 3 randomized controlled trial in 13 000 people it has been reported that 14 days after 2 doses of vaccination on days 2, the protection against symptomatic COVID-19 of the vaccine was 84% and the protection against hospitalization was 100% [14]. Before healthcare workers of our hospital were vaccinated, 317 people (20%) had covid 19 infection. 5 people (0.3%) after the 1st dose of vaccination, 73 people (4.6%) became infected after second dose. The hospitalization rate was 1.4% (n: 23) in the unvaccinated and 0.1% (n: 2) on the 7th day of the second dose of vaccine. The UK variant emerged in the UK in September 2020 and was found to contain multiple mutations. This variant has been noted to spread more easily and quickly than other variants and has since been detected in many countries around the world [15]. 42 UK variants were detected in our healthcare workers; 7 physicians (16%) became infected for an average of 55 days (4 females, 3 males) after receiving the second dose of vaccine. The UK variant was detected in 18 nurses (42%). 8 people had received 2 doses of vaccine. It was after 59.2 days on average. (7 females, 1 male), 5 technicians (12%); 2 technicians, 2 persons (2 females) who received the 2nd dose vaccine after 34 days, 3 medical secretaries (7%); 1 medical secretary 2nd dose 1 male after 55.6 days on average, 2 security workers (5%); 1 security worker 31 days after 2nd dose, 7 cleaning staff (18%) vaccinated; 4 subjects (1 female, 3 males) developed a UK variant infection 70.2 days after second dose of vaccine. The South African variant arose independently of other variants and was first identified in early August 2020. It has been reported that it shares some mutations with the UK variant, and similarly, this variant is more contagious than the original virus [15]. In our study, the South African variant was detected in 3 nurses (60%) an average of 35 days after the second dose of vaccine, and 46 days after the second dose in 1 of 2 security workers (40%). It has been noted that most of the employees diagnosed with COVID-19 had only mild or nonspecific symptoms during the clinical trial. Early and non-specific symptoms are difficult to identify, so healthcare professionals may inadvertently infect vulnerable patients or other personnel [16].

Conclusion

As a result, COVID 19 remains a threat to the entire world. Vaccination, personal and social measures will increase the chances of success in the fight against Covid 19. Although it cannot completely prevent the disease, the prevention of critical illness and death should be considered a great success for vaccines. Any symptoms of COVID-19 found among vaccinated healthcare workers should not be considered vaccine-related events, and these healthcare workers should be considered suspected COVID-19 cases until COVID-19 infection has been ruled out. In addition, active and passive surveillance and routine laboratory testing are necessary to identify COVID-19 among healthcare workers, even if they are vaccinated, to prevent transmission to other healthcare workers and healthcare settings. The importance of promoting vaccination among healthcare workers has been recognized.

References

1. Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. 2020; 5: 475-483.
2. Dhama K, Khan S, Tiwari R, Sircar S, Bhat S, Malik YS, et al. Coronavirus disease 2019-COVID-19. *Clin Microbiol Rev*. 2020; 33: 28-20.
3. Gao Q, Bao L, Mao H, Wang L, Xu K, Yang M, et al. Development of an inactivated vaccine candidate for SARS-CoV-2. *Sci*. 2020; 369: 77-81.
4. Zhang Y, Zeng G, Pan H, Li C, Hu Y, Chu K, et al. Safety, tolerability, and immunogenicity of an inactivated SARS-CoV-2 vaccine in healthy adults aged 18-59 years: a randomised, double-blind, placebo-controlled, phase 1/2 clinical trial. *Lancet Infect Dis*. 2021; 21: 181-192.
5. Bakanligi TCS. COVID-19 (SARS-CoV2 Enfeksiyonu) Rehberi.
6. Bi Q, Wu Y, Mei S, Ye C, Zou X, Zhang T, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: a retrospective cohort study. *Lancet Infect Dis*. 2020; 1473-3099.
7. Bohmer MM, Buchholz U, Corman VM, Hoch M, Katz K, Marosevic DV, et al. Investigation of a COVID-19 outbreak in Germany resulting from a single travel-associated primary case: a case series. *Lancet Infect Dis*. 2020; 30314-30315.
8. Tomlinson B, Cockram C. SARS: experience at Prince of Wales hospital. *Hong Kong Lancet*. 2003; 361: 1486-1487.
9. Avrupa Hastalık Önleme ve Kontrol Merkezi. 2015.
10. Birligi TT. COVID-19 Hastalığına Yakalanmış Sağlık Çalışanları. Ankara: TTB 20 Ekim. 2020.
11. WHO. Evidence Assessment: Sinovac/CoronaVac COVID-19 vaccine.
12. Cucunawangsih C, Wijaya RS, Lugito NPH, Suriapranata I. Post-vaccination cases of COVID-19 among healthcare workers at Siloam Teaching Hospital, Indonesia. *Int J Infect Dis*. 2021; 107: 268-270.
13. Hitchings MDT, Ranzani OT, Torres MSS, Oliveira SB, Almiron M, Said R, et al. Effectiveness of Corona Vac among healthcare workers in the setting of high SARS-CoV-2 Gamma variant transmission in Manaus, Brazil: A test-negative case-control study. *Lancet Reg Health Am*. 2021; 1: 100025.
14. Bayram A, Demirbakan H, Karadeniz PG, Erdogan M, Kocer I. Quantitation of antibodies against SARS-CoV-2 spike protein after two doses of CoronaVac in health care workers. *J Med Virol*. 2021.
15. Firat M, Yucesan B, Ozkan O. SARS-CoV-2 Variants of concern detected in Turkey – Overview of Pandemia in Cankiri Eurasian. *JHS*. 2021; 4: 138-144.
16. Keeley AJ, Evans C, Colton H, Ankcorn M, Cope A, Bennett T, et al. Roll-out of SARS-CoV-2 testing for healthcare workers at a large NHS Foundation Trust in the United Kingdom. 2020; 25: 2000433.