Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Microbial Pathogenesis 158 (2021) 105086

Contents lists available at ScienceDirect

Microbial Pathogenesis

journal homepage: www.elsevier.com/locate/micpath

Partial protection of Sinopharm vaccine against SARS COV2 during recent outbreak in Bahrain

Mohamed Jahromi [a,*], Mona Hmoud Al Sheikh [b]

[a] Prime Autoimmunity Center, Manama, Bahrain
[b] Physiology Department, Imam Abdul Rahman University, Dhahran, Saudi Arabia

ARTICLE INFO

Keywords:
Vaccines
S protein
SARS CoV 2
WHO
GCC

ABSTRACT

Background: In order to impart immunity against SARS COV 2 in the community, the oil rich countries of the Gulf Cooperation Council (GCC) provided citizens and expatriates with free vaccination. Different types of vaccination brands were utilized for this purpose. The purpose of this study is to determine the efficacy of the different types of vaccinations used.

Methods: This is an observational analytical case study of one Bahraini family who were vaccinated with 1st, 2nd or no dose.

Results: Out of 22 double dose recipients of SARS COV2 vaccine, 20 were infected. Those 20 were vaccinated against SARS COV 2 using Sinopharm, the rest (2) were in direct contact with the source but were vaccinated against SARS COV 2 using other type of vaccine. Out of 26 single dose recipients of Sinopharm vaccine, 23 were infected. The other three were not in direct contact with the infected source. Social gathering has been the main source of transmission. The infection has been mild with headache, chest pain. From 20 cases with double dose vaccinations only one had a lung infection and needed hospitalization. Out of 23 cases with single dose vaccinations 10 were hospitalized due to lung infections. All family members who were not vaccinated were infected, three were hospitalized one of which was deceased due to diabetes mellitus complications.

Conlcusion: Sinopharm provides partial protection against SARS COV 2 infection. That might be due to lack of its potential to detect recent variations in the protein structure of spike(S) protein of virus.

1. Introduction

The current SARS COV 2 outbreak was highly contagious and widely spread. Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS CoV 2). Globally, as of July 4, 2021, there have been 182,319,261 confirmed cases of SARS CoV 2 including 3,95,32 deaths, reported to the World Health Organization (WHO, https://covid19.who.int/). Vaccination is the best way to fight SARS CoV 2 infection. To date, more than eight COVID-19 vaccines have been approved for vaccination among priority groups under an Emergency Use Authorization (EUA), including the Pfizer- BioNTech BNT162b2 vaccine [1], Sinopharm's COVID-19 vaccines, Russia's Sputnik V, AstraZeneca's ChAdOx1 novel coronavirus 2019 (nCoV-19) [2], Moderna mRNA vaccine [3], and Janssen's Ad26.COV2. S [4], Table 1.

Bahrain along with other Gulf Corporation Countries (GCC) have been pioneers in controlling the SARS COV 2 pandemic. This started with a compulsory two weeks lockdown in early March 2021, but life returned to normal soon afterwards. Later on, Bahrain participated in the third phase of Sinopharm clinical trials, and was faced with a sudden steep peak of COV 2. The Kingdom of Bahrain, is a GCC country. The island nation comprises a small archipelago made up of 70 natural islands and an additional 33 artificial islands, centered around Bahrain Island which makes up around 83% of the country's landmass with a population of > two million. It is connected to Saudi Arabia via a 21 Km causeway. There is a great common socioeconomic as well as blood relationship between Bahraini and Saudi Arabia citizens. Both countries have pioneered in controlling COVID 19 with minimum lockdown and disturbance of social community. Along with other Gulf Corporation Countries (GCC), they have provided free vaccination to their populations, citizens and residents. In fact, in Saudi Arabia and Bahrain populations are given the choice of which vaccine to take. The choice included Pfizer-BioNteck, Sinopharm, Oxford-Astra Zenica and Sputnik V. In Saudi Arabia, Pfizer is the leading vaccine type, but due to

* Corresponding author.
E-mail addresses: mjahromi@yahoo.com (M. Jahromi), msheikh@iau.edu.sa (M.H. Al Sheikh).

https://doi.org/10.1016/j.micpath.2021.105086
Received 9 June 2021; Received in revised form 5 July 2021; Accepted 6 July 2021
Available online 11 July 2021

Table 1
Tabulation of the most frequent used vaccines against COVID 19.

Vaccine	Vaccine Type	Administered doses	Efficacy (%)
Oxford/ AstraZeneca	Adenovirus	2	65.5
Pfizer/BioNTech	mRNA	2	94
J&J/Janssen	Adenovirus Vector	1	66
Moderna	mRNA	2	94.1
Novavax	Protein plus Adjuvant	2	89.3
Sinopharm	Inactivated Whole Virus	2	79
Sputnik V	Adenovirus Vector	2	92

Table 2
Study group.

Age Group/Years (Median Age)	VACCINATED		
	None (%)	1st dose (%)	2nd dose(%)
18-86 45.3	8 (14.3)	26 (48.4)	22 (39.3)

conditional storage criteria it is available only in health centers equipped with -80°C since it requires special storage temperatures, only a few places can give it. However, as stated earlier Bahrain has participated in the third and final clinical trials of Sinapharm vaccine [5] and due to a strong belief of majority of Bahraini people that the old and gold standard method of using inactivated virus for vaccination, Sinopharm has been widely chosen.

Throughout the pandemic period Bahrain and Saudi Arabia controlled the unprecedented situation ingeniously. Initially, they proposed only two weeks total lockdown. Due to spread of general awareness using social media and other means of communications, there were only 10s of well-controlled cases with 1 or two deaths weekly. In Bahrain, that flat curve continued until December 2020. Then the cases have been increasing in an exponential manner and reached 100s, and recently have reached a very sharp slope and reached to 2000 cases per day and deaths of 18 per day on average.

In general, SARS CoV 2 vaccination has proceeded quite successfully and by the end of June 2021 a total of 993896 (47% of total population) of Bahraini population have had both doses of the vaccine and a total of 1061023 (50.6% of total population) have had their first dose of vaccination.

Although the EUA of vaccines has brought hope to people under threat of the COVID-19 pandemic, the emergence of SARS CoV 2 variants at S proteins of virus at the end of 2020 has rendered the situation confusing. On December 19, 2020, the United Kingdom reported the spread of the SARS CoV 2 variant 20I/501Y.V1 [(lineage B.1.1.7) Alpha] [6]. At the end of December, the SARS CoV 2 variant 20H/501Y.V2 [(lineage B.1.351) Beta] appeared in South Africa [7] On January 2021, the SARS CoV 2 variant 20J/501Y.V3 [(lineage P.1, a branch of the B.1.1.28 lineage) Gamma] [8]appeared in Brazil, which added more confusion.

In addition, the mutants of the S protein are considered to pose a risk of immune escape or increased the angiotensin converting enzyme 2 (ACE2) binding by the virus, thereby affecting SARS CoV 2 vaccine development and antibody treatment [9]. Recently, Bindayna et al. have reported the presence of E484K variant among COVID 19 patients in Bahrain [10]. The E484K mutation is not a new variant in itself, it is an alteration which has been reported in different variants like the British, Brazilian and South African.

Therefore, vaccines under EUA may need to be updated periodically with respect to clinical efficacy against SARS CoV2 variants. Currently, many vaccines that have entered the clinical trial phase were developed based on the S protein, and the data indicate that the S protein is the most mutated part of the SARS CoV 2 virus. Increasing evidence also shows that some COVID-19 vaccines are less effective in protecting against variants [11]. These data suggest that vaccine manufacturers must update their vaccines in time to deal with viral mutations. Otherwise, the efficacy of the COVID-19 vaccine may be affected.

2. Methodology

An extensive multiplexed Bahraini family, who received vaccination against SARS Cov 2, but still got infected was enrolled in this observational study (Table 2). The cases were recorded as diagnosed by Bahraini Ministry of Health affiliated centers for SARS CoV 2.

Written informed consents were collected from each participant family member.

3. Results

Table 3 summarizes home quarantined, hospitalized and deceased cases (Table 3). Interestingly, majority of the infected family members were those who have had Sinopharm vaccine. There have been no reported complications especially among vaccinated old ages 65–85 years old. There has been a case for a non-smoker 59-year-old man who had breathing problems and was hospitalized. Another case, a 30-year-old lady who have had infection for the second time in less than a year. Interestingly, children aged 17 months and older also were infected with a very mild course of the disease. Out of eight unvaccinated members aged (60–86), all were infected, three of them were hospitalized, and one was deceased with diabetic complications.

4. Discussion and conclusion

Current SARS CoV 2 outbreaks have been very contagious which seems to be due to mutations in S protein of virus, E484K [10], as it has been reported in Britain, South Africa, Brazil and India [12–14]. Interestingly, two of individuals who had direct contacts with the source but were taken different type of vaccine did not show any symptoms. As a response, Bahrain started giving Pfizer booster to Sinopharm vaccine recipients. Our conclusion is that Sinopharm vaccine provides protection and reduces casualty but cannot prevent infection.

Table 3
Presents summary of the cases.

Vaccinated	Sinopharm	Infected (Type of Vaccine)	Home quarantined	Hospitalized	Deceased
Nil	–	8 (Nil)	5	3	1
1st dose	26	23 Sinopharm	13	10	0
2nd dose	20	20 Sinopharm	19	1	0

5. Concluding remarks

- use of inactivated native Wuhan SARS COV 2 viruses while others who have used molecular biotechnology might not be able to protect individuals from other strands of SARS COV 2 virus.
- Protective measure should be taken into consideration until the society reaches herd immunity.

In order to validate the above observational study, we would recommend to repeat such a study at a larger scale with a larger number of vaccinated patients by different brands. We also recommend quantifying the amounts of antibody produced by each and every vaccine. Owing to the availability of research facilities different strains of virus can be identified and the efficacy of vaccines determined. Further, some other variables i.e., no travel ban or restriction from infected countries, resuming local Cafés, false feeling of protection (pseudo protection) as a result of mass vaccination might have contributed to the latter outbreak of SARS COV 2.

Author statement

MJ contributed in research idea, methodology, data collection and writing up. MHS participated in methodology and editing.

Declaration of competing interest

This is to declare that authors have no Any financial interests or connections, direct or indirect, or other situations that might raise the question of bias in the work reported or the conclusions, implications or opinions stated.

References

[1] Mahase E. Covid-19: UK approves Pfizer and BioNTech vaccine with rollout due to start next week. doi:10.1136/bmj.m4552.

[2] Mahase E. Covid-19: Russia approves vaccine without large scale testing or published results. doi:10.1136/bmj.m3205.

[3] S.E. Oliver, J.W. Gargano, M. Marin, M. Wallace, K.G. Curran, M. Chamberland, et al., Morbidity and mortality weekly report the advisory committee on immunization practices' interim recommendation for use of Moderna COVID-19 vaccine-United States, december 2020, Available, www.cdc.gov/vaccines/covid-19/info-by-product/moderna/, 2020.

[4] K.E. Stephenson, M. le Gars, J. Sadoff, A.M. de Groot, D. Heerwegh, C. Truyers, et al., Immunogenicity of the Ad26.COV2.S vaccine for COVID-19, JAMA - Journal of the American Medical Association 325 (2021) 1535–1544, https://doi.org/10.1001/jama.2021.3645.

[5] N. al Kaabi, Y. Zhang, S. Xia, Y. Yang, M.M. al Qahtani, N. Abdulrazzaq, et al., Effect of 2 inactivated SARS-CoV-2 vaccines on symptomatic COVID-19 infection in adults A randomized clinical trial supplemental content, 2021, https://doi.org/10.1001/jama.2021.8565.

[6] S.E. Galloway, P. Paul, D.R. Maccannell, M.A. Johansson, J.T. Brooks, A. Macneil, et al., Emergence of SARS-CoV-2 B.1.1.7 lineage — United States, december 29, 2020–january 12, 2021, Available, https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/.

[7] I.D.C.B. F Vogels, M.I. Breban, I.M. Ott, T.I. Alpert, M.E. Petrone, A.E. Watkins, et al., Multiplex qPCR discriminates variants of concern to enhance global surveillance of SARS-CoV-2 Network for Genomic Surveillance in South Africa, 2021, https://doi.org/10.1371/journal.pbio.3001236.

[8] D. Wrapp, N. Wang, K.S. Corbett, J.A. Goldsmith, C.-L. Hsieh, O. Abiona, et al., Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation, Available, http://science.sciencemag.org/, 2019.

[9] Koyama T, Weeraratne D, Snowdon JL, Parida L. Emergence of drift variants that may affect COVID-19 vaccine development and antibody treatment. doi:10.3390/pathogens9050324.

[10] K.M. Bindayna, A.H.A.F.S. Deifalla, H.E.M. Mokbel, Identification of E484K and other novel SARS-COV-2 variants from the Kingdom of Bahrain, Microb. Pathog. 157 (2021), https://doi.org/10.1016/j.micpath.2021.104955.

[11] Z. Wang, F. Schmidt, Y. Weisblum, F. Muecksch, C.O. Barnes, S. Finkin, et al., mRNA vaccine-elicited antibodies to SARS-CoV-2 and circulating variants, Nature 592 (2021) 616, https://doi.org/10.1038/s41586-021-03324-6.

[12] E. Boehm, I. Kronig, R.A. Neher, I. Eckerle, P. Vetter, L. Kaiser, Novel SARS-CoV-2 Variants: the Pandemics within the Pandemic. Clinical Microbiology and Infection, Elsevier B.V., 2021, https://doi.org/10.1016/j.cmi.2021.05.022.

[13] O.P. Choudhary, Priyanka, I. Singh, A.J. Rodriguez-Morales, Second wave of COVID-19 in India: dissection of the causes and lessons learnt, Trav. Med. Infect. Dis. 43 (2021) 102126, https://doi.org/10.1016/j.tmaid.2021.102126.

[14] B. Zhou, T. Thi Nhu Thao, D. Hoffmann, A. Taddeo, N. Ebert, F. Labroussaa, et al., SARS-CoV-2 spike D614G change enhances replication and transmission, Nature (2021) 592, https://doi.org/10.1038/s41586-021-03361-1.