Iniciação Científica **CESUMAR**
jul./dez. 2021, v. 23, n. 2, p. 201–205
DOI: 10.17765/2176–9192.2021v23n2e10400

e–ISSN: 2176–9192

COVID–19 REINFECTION BETWEEN DOSES OF VACCINATION: CASE REPORT IN A CITY OF BRAZIL'S SOUTHEAST

REINFECÇÃO DE COVID–19 ENTRE DOSES DA VACINAÇÃO: RELATO DE CASO EM UMA CIDADE DO SUDESTE DO BRASIL

Murilo Soares Costa[1], Gabriel de Oliveira Gelape[2], André Barbosa de Andrade[2], Luiza Passini Vaz–Tostes[2], Madara da Silva Simões[2], Rhuan Braga Oliveira[2], Nathalia Sernizon Guimarães[3], Unaí Tupinambás[4]

Autor correspondente: Murilo Soares Costa – E–mail: murilosoasta@gmail.com

ABSTRACT
Vaccination against COVID–19 is happening worldwide, with most vaccines requiring 2 doses to reach its maximum potential. It is the most efficient measure to prevent new cases of COVID–19, both of infection and reinfection. This case reports the reinfection of a female receptionist at an urgent care facility, where the research group was testing and monitoring symptoms of patients with flu syndrome, in the city of Belo Horizonte, Minas Gerais, Brasil, where she reinfected between the two preconized doses. Her initial infection occurred in September 2020 and reinfection in February 2021, 14 days after the first dose – both confirmed by RT–PCR – with reportedly worse symptoms on the latter. We warn for the possibility of reinfection episodes even after the first dose of vaccination, differently from what literature stated so far, so that health agents can organize more effective security measures, in a context of viral mutation and of new strains.

Keywords: Case report. COVID–19. Pandemic. Reinfection. SARS–CoV–2. Vaccination.

RESUMO
A vacinação contra a COVID–19 está acontecendo mundialmente, com a maioria das vacinas necessitando de duas doses para atingir o seu potencial máximo. É o método mais eficaz para prevenir novos casos de COVID–19, tanto por infecção ou por reinfecção. Este relato discorre a respeito de uma paciente do sexo feminino, recepcionista de uma Unidade de Pronto Atendimento onde o grupo de pesquisa realizava testagem e monitoramento de sintomas de pacientes com síndromes gripais, na capital do Estado de Minas Gerais, Brasil, que se reinfectou entre as duas doses preconizadas de vacinação. A primeira infecção ocorreu em setembro de 2020, enquanto a reinfecção ocorreu em fevereiro de 2021, 14 dias após a primeira dose do esquema vacinal – ambos os casos confirmados com RT–PCR – com piores sintomas nesta segunda ocasião. Nós alertamos a possibilidade de reinfecção mesmo após a primeira dose, ao contrário do que estava sendo preconizado na literatura, para que os agentes de saúde possam estabelecer medidas de segurança mais efetivas, principalmente em um contexto de mutação viral e de novas variantes.

Palavras–chave: COVID–19. Pandemia. Reinfecção. Relato de caso. SARS–CoV–2. Vacinação.

[1] Doutorando em Infectologia e Medicina Tropical pela Universidade Federal de Minas Gerais (UFMG), Belo Horizonte (MG), Brasil.

[2] Acadêmicos de Medicina da Universidade Federal de Minas Gerais (UFMG), Belo Horizonte (MG), Brasil.

[3] Doutora em Infectologia e Medicina Tropical pela UFMG, Pós–Doutoranda em Saúde Coletiva pela Universidade Federal da Bahia (UFBA), Salvador (BA), Brasil.

[4] Doutor em Infectologia e Medicina Tropical pela UFMG, Docente do Programa de Pós–Graduação em Infectologia e Medicina Tropical da UFMG e do Departamento de Clínica Médica da Faculdade de Medicina da UFMG, Belo Horizonte (MG), Brasil.

INTRODUCTION

The pandemic caused by coronavirus disease 2019 (COVID–19), which started in China and spread around the world, has already caused millions of cases and deaths around the world, raising the debate on the most effective prevention measures to fight the disease, among them is vaccination (KRAUSE; GRUBER, 2020).

Vaccination against the new coronavirus was first instituted on front–line workers in Brazil to prevent these individuals from getting infected and to avoid mortality and morbidity, even in those who had already been infected. Though the results of efficacy are promising, the current status of the vaccination process does not imply complete and long–lasting immunity or safety, only after mass vaccination the extent and the possible late adverse reactions will be elucidated (KOCHHAR; SALMON, 2020; KRAUSE; GRUBER, 2020).

Therefore, public authorities and the scientific community must play a fundamental role by reporting reinfection cases and adverse reactions to the vaccine, which will be helpful to elucidate for how long might a first infection protect from a second one, which are the most common adverse reactions and how safe and effective are the vaccines in a context of viral mutation, as the one the world faces. (GUDBJARTSSON, *et al*, 2020; KOCHHAR; SALMON, 2020; KRAUSE; GRUBER, 2020; FREITAS; GIOVANETTI; ALCANTARA, 2021).

This report aims to record a case of reinfection between the two doses of vaccine in a health care worker and the closure of the case. In order to combat a public health problem about false news involving immunization after infection, possible cases of reinfection even when vaccinated, it is necessary to maintain all protective measures after vaccination, especially in a context of viral mutation.

2 METHODS

This study is a case report guided by CARE from Equator. The research participant was followed by the researchers through the program for the diagnostic evaluation of COVID–19 in patients with flu–like illness treated at the specialized center of the Emergency Care Unit Centro Sul (UPA–Centro Sul) of Belo Horizonte through the Pool Testing method.

The research participant works on the front line as a receptionist at a COVID–19 emergency care unit, was infected in September 2020 and was reinfected with the SARS–CoV–2 virus after the 1st dose of vaccination against COVID–19 of the manufacturer SINOVAC (CoronaVac vaccine), in February 2021. The vaccine shot was taken in the early stages of the city`s vaccination program, which began by the priority groups, followed chronologically by age.

It was tested using the Reverse Transcription Polymerase Chain Reaction (RT–PCR) method on both occasions, being further retested in the second infection, confirming reinfection. The present study was approved by the ethics committee of the Federal University of Minas Gerais (UFMG), in June 2020, CAAE–35074720.3.0000.5149.

3 RESULTS

Female patient, 31 years old, front–line health care worker in an emergency unit in the city of Belo Horizonte, Minas Gerais, Brazil. First, she presented headache and myalgia on September 8th, 2020. On the following day, she was tested with RT–PCR with a positive result for COVID–19. Acetaminophen, metoclopramide and loratadine were prescribed for treatment of her symptoms and she was discharged from the unit to finish recovery isolated at home. During the following week she presented full improvement at home, without further need of hospitalization.

On January 27th, 2021, she was vaccinated with the first dose and, 14 days later, on February 10th, 2021 she was vaccinated with the second dose

while still working on the same unit. In the following day of the second dose she developed mild myalgia, sore throat, nuchalgia, ventilatory dependent thoracic pain, dry cough and a burning pain in the back, when she sought medical care. It was sorted as a possible COVID–19 case in the care unit and, again, she was tested, oriented and treated for her symptoms. During this second infection her headache became worse, and she developed nasal congestion that improved in the following days. Five days after her first test, she was tested again by our research group that pool tested her sample, confirming the infection. Her doctor also suspected of an allergic response to the vaccine. She had no prior history of any risk condition. On neither occasion she presented shortness of breath, desaturation, tachycardia or alteration of vital signs that required urgent specialized attention.

Table 1. Information on COVID–19 infections

	1nd infection	**2nd infection**
Date	Set 8th 2020	Feb 11th 2021
Symptoms	Headache and myalgia	Mild myalgia, sore throat, nuchalgia, thoracic pain, dry cough and nasal congestion
RT–PCR	Set 9th 2020	Feb 12th 2021

Case Overview

4 DISCUSSION

As in every new emerging disease that is yet under study, uncertainty of data is a big challenge. The decrease of antibodies after the infection have been pointed out,[10] but its response to a second contact is yet to be fully elucidated. With new virus strains occurring worldwide, specifically in Brazil, where the sequencing of altered strains is proving that new strains are becoming more frequent in the country (SEOW *et al*, 2020), this immunological response is even more unclear, since the transmissibility of the virus itself is altering (BUSS *et al*, 2021).

Brazil's COVID–19 infectivity pattern is changing from the first wave and new strains identified in the United Kingdom (B.1.1.7), South Africa (B.1.351), Manaus – Brazil (P.1) and Rio de Janeiro – Brazil (P.2) are circulating in the country and are involved in these changes. All of them are related to a quicker expansion and afflict especially younger individuals and women and could have an association with a greater virulency (FREITAS *et al*, 2021). Epidemiologically speaking, our patient's reinfection can be related with new strains.

The possibility of a common adverse reaction to the vaccine was ruled out because they are, in order of most to less common: pain in the vaccination spot, headache and fatigue (especially after the second dose) (ZHANG *et al*, 2021). In her case, she developed all these symptoms, and important thoracic pain, dyspnea and nasal congestion, which alone could not be explained simply by an adverse reaction to the vaccine's second dose.

It was observed that individuals SARS–CoV–2–naive had an increase in antibody titers in both doses of vaccination, while SARS–CoV–2–experienced individuals had a stronger response to the first dose, rather than to the following second dose suggesting, by yet uncertain mechanisms, that one dose alone might provide the necessary protection (SAMANOVIC *et al*, 2021). In the case studied, even though the receptionist was SARS–CoV–2–experienced (with more than 90 days from the first viral contact) and had already taken her first dose of the two preconized in Brazil's Vaccination Program, she was reinfected, evolving with worse symptoms than she presented in the first infection, which has been seen in cases of reinfection in Brazil, and other parts of the world such as United States and Ecuador (FINTELMAN–RODRIGUES *et al*, 2021).

We must still be cautious about the impacts of vaccination. Though vaccines will have a great impact on mortality and morbidity, new strains are showing greater infectivity, resulting in poorer efficacy results in some vaccines, and the extent of this protection is still to be fully assessed. Progress on research with genome sequencing and understanding the population's immunological status will have a huge impact not only in the safety of front–line professionals, but also in

the general population. Still, if vaccinated, one must keep all safety protocols to avoid spreading the virus. Meanwhile, it is most appropriate to vaccinate as many people as possible in the shortest period, to restrict the circulation of the virus, stop the occurrence of more variants and prevent new infections or reinfections, which must be diagnosed through RT–PCR and, in selected cases, genetic sequencing. It is important to detect these possible reinfections, adverse reactions and new manifestations. Test people with signs and symptoms and report these cases are of great importance and strategies such as pool testing may help in scenarios of limited resources, such as the one Brazil currently faces, when crucial information may be missed if not tested or accessed (COSTA *et al*, 2021).

As a limitation of the study, we did not perform genetic sequencing of the strains detected in RT–PCR in the first infection and in the reinfection, to compare whether the reinfection occurred with the same strain or a different strain, this record being important for public health. As a practical implication, this study aims to alert that, even after being infected, everyone should take the vaccine – including the first and the second dose – against COVID–19, in addition to maintaining the protective measures after being vaccinated. It is noteworthy that even vaccinated people can become infected and transmit the virus, and that health professionals, especially those on the front line, deserve constant surveillance.

5 CONCLUSION

Cases of infection and reinfection of COVID–19 may occur after vaccination. Suspected cases, even after the vaccine, should collect a nasopharyngeal swab sample to investigate SARS–CoV–2 using RT–PCR. Suspected and confirmed cases must be reported to proper authority in order to have better understanding and allow development in the field of research, based on trustable data. One strategy for taking the exam, and allowing more people to be able to test, is through pool testing. The need to perform this test in people vaccinated with suspicious signs and symptoms is due to the circulation of variants occurring worldwide. While Brazil is still extremely vulnerable to constant mutations, efforts must be made to better understand these events.

REFERENCES

BUSS, L. F.; PRETE–JUNIOR, C. A.; ABRAHIM, C. M. M. et al. Three–quarters attack rate of SARS–CoV–2 in the Brazilian Amazon during a largely unmitigat–ed epidemic. **Science**, v. 371, n. 6526, p. 288–292, 2021.

COSTA, M. S.; SATO, H. I.; ROCHA, R. P. *et al*. Adjusting the Cut–Off and Maximum Pool Size in RT–qPCR Pool Testing for SARS–CoV–2. **Viruses**, v. 13, n. 4, p. 557, 2021.

FINTELMAN–RODRIGUES, N.; DA SILVA, A. P.D.; DOS SANTOS, M. C. *et al*. Genetic Evidence and Host Im–mune Response in Persons Reinfected with SARS–CoV–2, Brazil. **Emerging Infectious Diseases**, v. 27, n. 5, p. 1446–1453, 2021.

FREITAS, A. R. R.; BECKEDORFF, O. A.; CAVALCANTI, L. P. G.; SIQUEIRA, A. M.; CASTRO, D. B. de; COSTA, C. F. da *et al*. The Emergence of Novel SARS–CoV–2 Variant P.1 in Amazonas (Brazil) Was Temporally As–sociated with a Change in the age and Gender Profile of COVID–19 Mortality. **SSRN Electronic Journal**, v. 1, n.100021, sept. 2021.

FREITAS, A. R. R.; GIOVANETTI, M.; ALCANTARA, L. C. J. Variantes emergentes do SARS–CoV–2 e suas im–plicações na saúde coletiva. **InterAmerican Journal of Medicine and Health**, v. 4, 2021.

GUDBJARTSSON, D. F.; NORDDAHL, G. L.; MELSTED, P. *et al*. Humoral Immune Response to SARS–CoV–2 in Iceland. **New England Journal of Medicine**, v. 383, n. 18, p. 1724–1734, 2020.

KOCHHAR, S.; SALMON, D. A. Planning for COVID–19 vaccines safety surveillance. **Vaccine**, v. 38, n. 40, p. 6194–6198, 2020.

KRAUSE, P. R.; GRUBER, M. F. Emergency Use Au–

thorization of Covid Vaccines — Safety and Efficacy Follow–up Considerations. **New England Journal of Medicine**, v. 383, n. 19, p. e107, 2020.

SAMANOVIC, M. I.; CORNELIUS, A. R.; GRAY–GAIL–LARD, S. L. *et al*. Robust immune responses after one dose of BNT162b2 mRNA vaccine dose in SARS–CoV–2 experienced individuals. **medRxiv Preprint**. 2021.

SEOW, J.; GRAHAM, C.; MERRICK, B. *et al*. Longitudi–nal observation and decline of neutralizing antibody responses in the three months following SARS–CoV–2 infection in humans. **Nature Microbiology**, v. 5, n. 12, p. 1598–1607, 2020.

WIDGE, A. T.; ROUPHAEL, N. G.; JACKSON, L. A. *et al*. Durability of Responses after SARS–CoV–2 mRNA–1273 Vaccination. **New England Journal of Medi–cine**, v. 384, n. 1, p. 80–82, 2021.

ZHANG, Y.; ZENG, G.; PAN, H. *et al*. Safety, tolerability, and immunogenicity of an inactivated SARS–CoV–2 vaccine in healthy adults aged 18–59 years: a ran–domised, double–blind, placebo–controlled, phase 1/2 clinical trial. **The Lancet Infectious Diseases,** v. 21, n. 2, p. 181–192, 2021.

Recebido em: 28/09/2021

Aceito em: 05/11/2021