



Journal of Experimental Biology and Agricultural Sciences

<http://www.jebas.org>

ISSN No. 2320 – 8694

THE FIRST REPORT OF A POSSIBLE SARS-CoV-2 REINFECTION IN NEPAL

Ranjit Sah^{1,a,*}, Namrata Roy^{2,a}, Alfonso J. Rodríguez-Morales^{3,4,5}, Aman Mishra¹,
Santa Kumar Das¹, Laxman Shrestha¹, Yogendra Prasad Singh¹, Niranjan Prasad Shah¹,
Hari Prasad Kattel¹, Zareena Fathah⁶, Sadeq Quraishi⁷, Ebrahim Barkoudah⁸, Akihiko Ozaki⁹,
Tetsuya Tanimoto⁹, Andy Crump⁹, Ruchi Tiwari¹⁰, Khan Sharun¹¹, Senthilkumar Natesan¹²,
Karam Pal Singh¹³, Kuldeep Dhama^{13*}

¹Tribhuvan University Teaching Hospital, Institute of Medicine, Kathmandu, Nepal

²Department of Medicine, SRM Medical College Hospital and Research Center, Kattankulathur, Tamil Nadu, India

³Latin American Network of COVID-19 Research (LANCOVID), Pereira, Risaralda, Colombia

⁴Grupo de Investigación Biomedicina, Faculty of Medicine, Fundación Universitaria Autónoma de las Américas, Pereira, Risaralda, Colombia

⁵Universidad Privada Franz Tamayo, Cochabamba, Bolivia

⁶Kings College London, London, UK

⁷Department of Anesthesiology & Perioperative Medicine - Tufts Medical Center, Tufts University School of Medicine, Boston, Massachusetts, USA

⁸Harvard School of Public Health Boston, Massachusetts, USA

⁹Medical Governance Research Institute, Tokyo, Japan

¹⁰Department of Veterinary Microbiology and Immunology, College of Veterinary Sciences, UP Pandit Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vishwavidyalaya Evum Go-Anusandhan Sansthan (DUVASU), Mathura, Uttar Pradesh, India

¹¹Division of Surgery, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

¹²Department of Infectious Diseases, Indian Institute of Public Health Gandhinagar, Lekawada, Gandhinagar, Gujarat, India

¹³Division of Pathology, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

^aBoth authors equally contributed.

Received – October 22, 2020; Revision – January 21, 2021; Accepted – February 23, 2021

Available Online – February 27, 2021

DOI: [http://dx.doi.org/10.18006/2021.9\(1\).1.4](http://dx.doi.org/10.18006/2021.9(1).1.4)

KEYWORDS

SARS-CoV-2

Covid-19

Reinfection

Nepal

ABSTRACT

Since August 2020, a growing number of confirmed SARS-CoV-2 cases, after approximately three months, in most of them, again presented a new infection episode, which has been defined as reinfection. So far, no cases have been reported in Nepal, and still there is limited the number of them, especially of those fully confirmed. Here, we report a case and discuss its multiple implications in the ongoing COVID-19 pandemic.

* Corresponding author

E-mail: ranjitsah57@gmail.com (Dr. Ranjit Sah); kdhama@rediffmail.com (Kuldeep Dhama)

Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.

Production and Hosting by Horizon Publisher India [HPI]
(<http://www.horizonpublisherindia.in/>).
All rights reserved.

All the articles published by [Journal of Experimental Biology and Agricultural Sciences](#) are licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](#) Based on a work at www.jebas.org.



1 Introduction

There is a growing body of evidence regarding Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) reinfection (Alvarez-Moreno & Rodríguez-Morales, 2020). During 2020 at least 26 re-infected patients in nine countries had been suspected and confirmed (Tillett et al., 2020; To et al., 2020; Prado-vivar et al., 2020; Van Elslande et al., 2020; Mulder et al., 2020; Bonifacio et al., 2020; Gupta et al., 2020; Arteaga-Livias et al., 2020; Harrington et al., 2021). Of these, one died, while 23 recovered. The average time to reinfection was 74 days, with a range from 12–147 days. In at least seven cases, the reinfection was more severe than the original disease course. In several cases where the viral elements from patients were genomically analyzed, the second infection was with a different strain of SARS-CoV-2 than that which caused the original infection (Tillett et al., 2020; To et al., 2020; Prado-vivar et al., 2020; Van Elslande et al., 2020; Mulder et al., 2020; Bonifacio et al., 2020; Gupta et al., 2020).

Herein, we report a case of reinfection in a 25-year-old medical intern at a teaching hospital in Kathmandu, Nepal. The patient was tested for SARS-CoV-2 by nasal swab on August 15, 2020, as part of a contact tracing and testing procedure. He was identified as having been in contact with nurses who had tested positive for SARS-CoV-2 infection. He had reportedly been wearing a KN95 facemask and a full face shield, but it appeared that he might have been exposed to the virus while donning his personal protective equipment (PPE) in a confined space with other staff. His RT-PCR test resulted positive on August 17, 2020, having been processed using a Sansure Biotech Novel Coronavirus® (2019-nCoV) nucleic acid diagnostic kit on a Bio-Rad CFX 96 machine. The Ct values for the N and ORF1ab genes were 33 and 31 cycles, respectively, and the result was consistent upon repeated testing. The patient stayed in a hospital quarantine centre and remained asymptomatic for three days. On August 21, 2020, he reported fever and experienced malaise and a dry cough lasting four days, and his room-air oxygen saturation dropped to 92%. He had no anosmia, ageusia, or other symptoms typical of COVID-19, and did not require hospitalization or oxygen therapy. He tried alternative interventions for symptomatic care, such as steam inhalation, turmeric dissolved in hot water, zinc, calcium, vitamins C, D, and B complex. The patient reported the resolution of all his symptoms by August 25, 2020. A nasopharyngeal swab collected on August 26, 2020, proved to be negative. A second, confirmatory test, as per the WHO guidelines, was not undertaken. After 10 days of isolation and 72 hours free of symptoms, the patient was allowed to return to duty at the hospital as there was a shortage of medical staff (institutional policy).

Forty-four days after his primary infection with SARS-CoV-2, on October 11, 2020, he presented again with symptoms of runny nose, malaise, subjective fever, and a dry cough. His body

temperature was normal (37.6°C/99.6°F). He shared a room at his intern quarters and his co-habitant reportedly had been having similar symptoms for the previous several days and had tested positive for COVID-19 on October 13, 2020. Despite his thinking that he had developed possible immunity after recovering from COVID-19, the patient decided to seek another test on October 14, 2020, which proved positive (Ct values for the N and ORF1ab genes of 36 and 36 cycles, respectively). The following day he reported severe malaise, generalized body aches, and feeling feverish, with a dry cough, distorted sense of taste, and loss of smell. However, his maximum recorded axillary temperature was only 37.6°C. Given the high Ct value and his previous recovery from COVID-19, he underwent another RT-PCR test on October 17, 2020, after waiting to see if the Ct value decreased (signifying an increase in viral load) to confirm that the second infection was a true infection. The test, performed using a UNI-MEDICA Real-time PCR kit for Novel Corona Virus 2019-nCoV reagents on an ABI QuantStudio™ 5 Real-time PCR System, returned positive (Ct values for the N and ORF1ab genes of 32 and 30 cycles, respectively) confirming a true infection. Although the patient's symptoms were more severe during the reinfection than during his primary infection, his treatment was mainly supportive and similar to his first infection. He did not require hospitalization or oxygen therapy. By October 22, 2020 he was experiencing some residual malaise and anosmia but his other symptoms had resolved. On October 25, 2020, during repeat testing for SARS-CoV-2, the subject tested negative (Figure 1).

In both instances of infection in our patient, only one negative RT-PCR result was considered indicative of his recovery from illness rather than the two negative RT-PCR tests >24 hours apart required in many countries (Alvarez-Moreno & Rodríguez-Morales, 2020; Tillett et al., 2020; To et al., 2020; Prado-vivar et al., 2020). In Nepal, government regulations stipulate that a COVID-19 patient can be discharged following completion of 10 days of isolation and 72 hours of being free of symptoms. In reality, two sequential RT-PCR tests are not always possible in limited-resource settings (Alvarez-Moreno & Rodríguez-Morales, 2020). Consequently, the WHO has now issued new recommendations for discharging individuals from isolation or quarantine based on the transmission risk, namely 10 days after symptom onset plus at least three additional days without symptoms for symptomatic patients and 10 days after positive test results for SARS-CoV-2 for asymptomatic patients (Van Elslande et al., 2020; Mulder et al., 2020; Bonifacio et al., 2020; Gupta et al., 2020; Arteaga-Livias et al., 2020; Harrington et al., 2021).

Our experience suggests that further research is urgently needed to determine if SARS-CoV-2 is indeed capable of causing a latent infection that can be subsequently reactivated, especially given that infected individuals who remain asymptomatic are an important

source of human-to-human transmission. It is known that whatever immunity develops during SARS-CoV-2 infection and COVID-19 progression can be extremely short lived, seeming to disappear in as little as 2-3 weeks (Alvarez-Moreno & Rodríguez-Morales, 2020; Tillett et al., 2020; To et al., 2020). Conversely, the impact of COVID-19 and its sequelae can last for many months indicating that low-level latent infection may be a possibility. Unfortunately, we were unable to genetically compare the SARS-CoV-2 variants involved in the two infections to help resolve the question of whether different viral isolates were involved and whether antibody-dependent enhancement was involved, as is the case with dengue virus infection (Tillett et al., 2020; To et al., 2020; Pradovivar et al., 2020; Van Elslande et al., 2020; Mulder et al., 2020). Nevertheless, the possibilities of SARS-CoV-2 reinfection, latent infection, and antibody-dependent enhancement, all pose complex challenges concerning the immune response, an immunity passport, the effectiveness of a vaccine, all prevention and control measures to combat COVID-19, as well as the prospects for the disease becoming endemic.

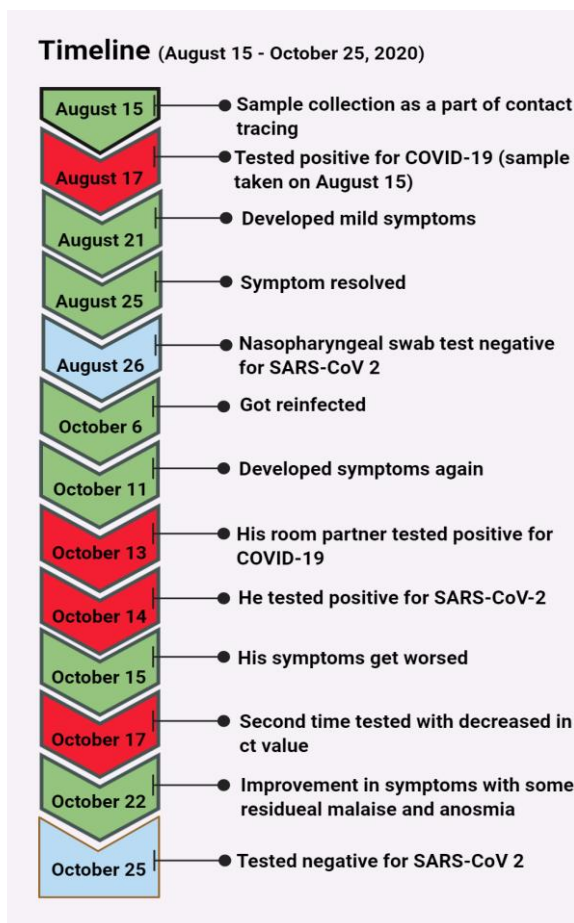


Figure 1 Timeline of symptom onset, diagnosis by RT-PCR, and disease progression from August 15 to October 25, 2020

Author contributions

All the authors substantially contributed to the conception, compilation of data, checking and approving the final version of the manuscript, and agree to be accountable for its contents.

Acknowledgements

None

Funding

No funding received

Conflict of Interest

All authors declare that there are no conflicts of interest.

Ethics Statement

According to local ethical guidelines no ethical clearance is required for a single Case Report.

Consent

Informed Consent (in writing) was obtained from the patient to publish this case information and also to be part of this article as co-author.

References

- Alvarez-Moreno CA, Rodríguez-Morales AJ (2020) Testing Dilemmas: Post negative, positive SARS-CoV-2 RT-PCR - is it a reinfection? *Travel Medicine and Infectious Diseases* 35: 101743.
- Arteaga-Livias K, Panduro-Correa V, Pinzas-Acosta K, Perez-Abad L, Pecho-Silva S, Espinoza-Sanchez F, Damaso-Mata B, Rodríguez-Morales AJ (2020) COVID-19 reinfection? A suspected case in a Peruvian patient. *Travel Medicine and Infectious Diseases* 39, 101947.
- Bonifácio LP, Pereira APS, Araújo DCAE, Balbão VDMP, Fonseca BALD, Passos ADC, Bellissimo-Rodrigues F (2020) Are SARS-CoV-2 reinfection and Covid-19 recurrence possible? a case report from Brazil. *Journal of the Brazilian society of tropical Medicine* 53:e20200619. doi: 10.1590/0037-8682-0619-2020.
- Gupta V, Bhojar RC, Jain A, Srivastava S, Upadhyay R, Imran M, Jolly B, Divakar MK, Sharma D, Sehgal P, Ranjan G, Gupta R, Scaria V, Sivasubbu S (2020) Asymptomatic reinfection in two healthcare workers from India with genetically distinct SARS-CoV-2. *Clinical Infectious Diseases* 23:ciaa1451. doi: 10.1093/cid/ciaa1451.

- Harrington D, Kele B, Pereira S, Couto-Parada X, Riddell A, Forbes S, Dobbie H, Cutino-Moguel T (2021) Confirmed Reinfection with SARS-CoV-2 Variant VOC-202012/01. *Clinical Infectious Diseases* ciab014. doi: 10.1093/cid/ciab014.
- Mulder M, van der Vegt DSJM, OudeMunnink BB, GeurtsvanKessel CH, van de Bovenkamp J, Sikkema RS, Jacobs EMG, Koopmans MPG, Wegdam-Blans MCA (2020) Reinfection of SARS-CoV-2 in an immunocompromised patient: a case report. *Clinical Infectious Diseases* ciaa1538. doi: 10.1093/cid/ciaa1538.
- Prado-Vivar B, Becerra-Wong M, Guadalupe JJ, Marquez Sully, Gutierrez B, Rojas-Silva P, Grunauer M, Trueba G, Barragan V, Cardenas P (2020) COVID-19 Re-Infection by a Phylogenetically Distinct SARS-CoV-2 Variant, First Confirmed Event in South America. *SSRN Electron Journal*. DOI:10.2139/ssrn.3686174.
- Tillett RL, Sevinsky JR, Hartley PD, Kerwin H, Crawford N, Gorzalski A, Laverdure C, Verma SC, Rossetto CC, Jackson D, Farrell MJ, Van Hooser S, Pandori M (2020) Genomic evidence for reinfection with SARS-CoV-2: a case study. *Lancet Infectious Diseases* 12:S1473-3099(20)30764-7. doi: 10.1016/S1473-3099(20)30764-7.
- To KK, Hung IF, Ip JD, Chu AW, Chan WM, Tam AR, Fong CH, Yuan S, Tsoi HW, Ng AC, Lee LL, Wan P, Tso E, To WK, Tsang D, Chan KH, Huang JD, Kok KH, Cheng VC, Yuen KY (2020) COVID-19 re-infection by a phylogenetically distinct SARS-coronavirus-2 strain confirmed by whole genome sequencing. *Clinical Infectious Diseases* 25:ciaa1275. doi: 10.1093/cid/ciaa1275.
- Van Elslande J, Vermeersch P, Vandervoort K, Wawina-Bokalanga T, Vanmechelen B, Wollants E, Laenen L, André E, Van Ranst M, Lagrou K, Maes P (2020) Symptomatic SARS-CoV-2 reinfection by a phylogenetically distinct strain. *Clinical Infectious Diseases* ciaa1330. doi: 10.1093/cid/ciaa1330.