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# Post-acute sequelae of SARS-CoV-2 Delta variant infection: A report of three cases in a single family

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Coronavirus disease 2019 (COVID-19) is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that has resulted in global pandemic and crisis in health care system. Several studies have focused only on hospitalized patients with 30 to 90 days after one cycle of illness but post-acute sequelae of COVID-19 existing even after a year remains unclear. Moreover, long-term sequelae in outpatients have not been documented and henceforth myriad clinical sequelae in long haulers continue to evolve. In this study, we report three cases represents a single family presenting several post-acute sequelae one after the other extending beyond one year of recovery. To our knowledge such a case series has not been reported in earlier studies. Herein, we present the sequelae in various organs namely neuropsychiatric (tinnitus, anxiety, depression, insomnia, and posttraumatic stress disorder, cognitive decline), cardiovascular (tachycardia, bradycardia), gastrointestinal (appendicitis) and Dermatologic (erythematous rash and acne) besides ophthalmic manifestations (*conjunctivitis and dry eyes)* in Long-COVID-19 and recommend management strategies.

**Keywords**: Antiviral Steroid therapy, Appendicitis, Case reports, COVID-19 survivors, Psychopathology, Tinnitus

SARS-CoV-2 has been spreading around the world since December, 2019 with high mortality rate or acute infection and World Health Organization (WHO) declared COVID-19 a pandemic. The delta (B.1.617.2) variant of SARS-CoV-2 was first identified India (Maharashtra) during late 2020 that outcompeted pre-existing lineages namely Kappa (B.1.617.1) and alpha (B.1.1.7)[1]. Experimental studies have reported six-fold and eight-fold less sensitive nature of B.1.617.2 to neutralizing antibodies of *convalescent serum* and vaccine-elicited antibodies, respectively, compared to wild-type Wuhan-1 SARS-CoV-2[2]. Moreover, B.1.617.2 showed lower neutralizing antibody titres in ChAdOx1 vaccines than BNT162b2 vaccines [3]. B.1.617.2 also had higher replication efficiency in airway epithelium or organoid with B.1.617.2 spike predominantly existing in cleaved state that further enhanced syncytium formation subsequently displaying lower sensitivity to neutralizing antibody[3]. The potential dominance of B.1.617.2 over other lineages could be due to increased spike mediated entry and high replication in B.1.617.2[3]. Also the mixed lineage circulation during Mid-2021 in India have reduced the efficacy of ChAdOx1 vaccine. This immune evasive B.1.617.2 caused tremendous burden to health care systems in India between April and June, 2021 with more than 200 million cases and high mortality rate. Though most of the patients recovered from acute infection of B.1.617.2, a subset of them sustain persistent symptoms that do not resolve even over a year. Post-acute sequelae of COVID-19 is diagnosed both in patients with severe and mild or asymptomatic infections[4]. Therefore, long-term follow-up investigations to evaluate the post-infectious sequelae in COVID-19 survivors are vital to enhance their diagnosis and survival. Earlier studies have reported that the COVID-19 patients discharged from hospital showed several health issues and persistent symptoms including impaired organ function, depression, detectable abnormalities in imaging techniques, anxiety and declined quality of life[5–8]. Most of the previous reports[5–8] have focused only on early follow-up (after 2-6 months of recovery)while later follow-up

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