

Investigation of the circulation of Variants of Concern of SARS-CoV-2 in the city of Uberlândia, Minas Gerais

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The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in Wuhan-China, as the causative agent of the coronavirus disease 2019 (COVID-19). Since notified in São Paulo on 26th February 2020, more than 21,000,000 cases and 587,000 deaths were reported in Brazil. SARS-CoV-2 is a positive single-stranded RNA virus with a large RNA, and variants of this virus have been rising worldwide during the ongoing pandemic. The mutations that attracted most of the attention occurred mainly in the genomic region of Spike glycoprotein, which is fundamental for SARS-CoV-2 attachment to the host cell. These mutations are associated with host adaptation, escape of immune system, efficacy of vaccines and diagnostics, generating the named Variants of Concern (VOCs). According to the World Health Organization, up to date, four variants are classified as VOCs: Alpha, Beta, Gamma and Delta. Brazil has become an important epicenter of COVID-19, with the four VOCs found circulating in the country. Although there is no large scientific data that links the scenario of the pandemic in Brazil to VOCs circulation, the first quarter of 2021 has been the worst period of the pandemic for the Brazilian population, with reports of Alpha and Gamma circulation. Here we performed a RT-qPCR protocol able to identify Alpha, Beta and Gamma VOCs in 200 clinical samples of COVID-19 confirmed cases collected in Uberlândia, from December 2020 to March 2021, in order to evaluate the characterization of circulating viral strains in the city,

which reported an increased number of covid-19-related cases and deaths during this period. Our analyses demonstrated that Alpha circulation occurred in early December, and Gamma introduction in late January. An increase in VOCs identification was observed among samples over time, compared to other lineages. In December 2020, the majority of samples were identified as Alpha variant, however, with the insertion of the Gamma variant in late January, the scenario of VOCs circulation was changed, reaching up to 90% of the samples in March classified as Gamma. It suggests that over time, with flexibility of social isolations measures, the viral strains that were first identified in United Kingdom (Alpha) and Manaus (Gamma) have probably spread to others regions, and that due to advantageous mutations, the viral spread of VOCs end up becoming predominant in the region. These results reinforce the need of genomic surveillance for a better understand of the ongoing spread of emerging viral pathogens.

Keyword: SARS-CoV-2, COVID-19, genomic surveillance, Minas Gerais, RT-qPCR, VOCs.

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