ORT_14 - Neutralizing antibody Levels against Wuhan Strain and the Omicron Variant of SARS-CoV-2 in patients with COVID-19 Disease

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Introduction: Globally, the health systems have been significantly impacted since the emergence of COVID-19, caused by the SARS-CoV-2 virus, in late 2019. Most cases are considered mild or asymptomatic, mainly in a low-risk population. In addition, the newly emerging VOCs, or VOIs have exhibited mutations that may impact various aspects of the virus's biology, such as its pathogenicity and antigenicity, leading to its potential escape from current neutralizing antibodies (NAb).

Objectives: We aimed to compare clinical status with NAb titers against Wuhan strain and the Omicron variant of SARS-CoV-2 in hospitalized volunteers with COVID-19 disease, using a validated $PRNT_{50}$.

Methodology: Sera from 110 volunteers were measured regarding the NAb titers specific to the original strain (Wuhan) and the Omicron variant using PRNT50. For this, SARS-CoV-2 virus was pre-incubated with or without serially diluted serum before being added to Vero cells (200,000 cells/mL) in 24 well plates, overlayed by 1mL of CMC 1.5% and incubates at 37°C for 72h. Groups were further stratified by disease severity –mild or severe— and gender.

Results: All tested samples for the Wuhan strain showed higher NAb titers than those observed against Omicron (**$p<0.01$). Moreover, NAb levels were remarkably higher in patients with severe symptoms than those with mild cases. No statistically significant difference in Nab levels was observed between genders, except for the group of mild cases assessed specifically against Omicron variant (*$p<0.05$).

Conclusion: In contrast to other variants, Omicron has been associated with a higher reinfection rate. This could be explained by the significant decline in the ability of NAb response from previous infections to neutralize Omicron variant. As we found in this study, regardless of gender or disease severity, the NAb titers against Wuhan strain are significantly higher than against Omicron. Severe cases may have had higher NAb levels due to probably higher SARS-CoV-2 viremia than in mild cases. Although the PRNT assay may suggest a lower Nab level for newly emerging variants, this does not necessarily translate into an increased risk of severe clinical illness as the immune response is broader than only that of the neutralizing antibodies.

Keywords: SARS-CoV-2; $PRNT_{50}$; Neutralizing antibody