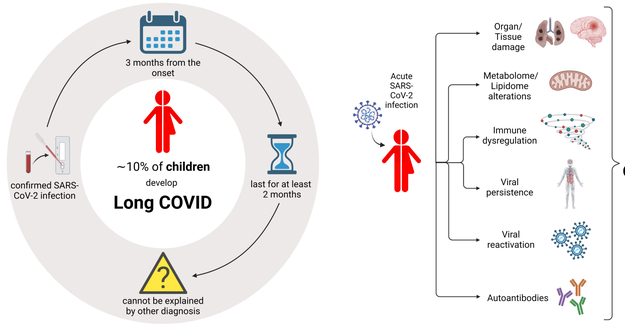
LONG COVID IN CHILDREN IS ASSOCIATED WITH LOWER ANTI-RBD IgG/IgA AND NEUTRALIZING ANTIBODY LEVELS

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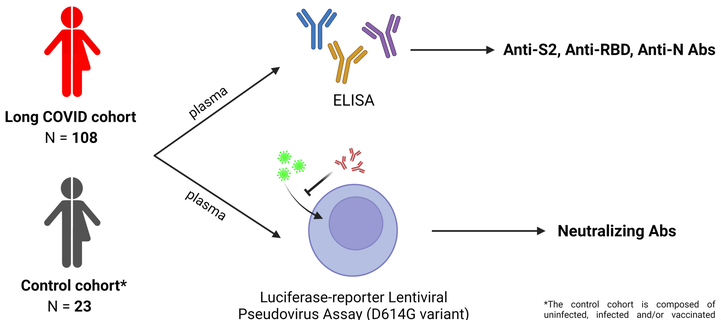
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BACKGROUND



AIM: To determine whether Long COVID affected pediatric individuals showed distinctive humoral features related to the disease

METHODS



RESULTS

1. Participants' characteristics

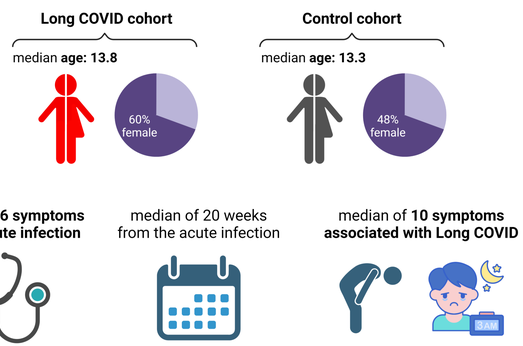


Table 1: Long COVID and control cohort specific SARS-CoV-2 variant of concern

SARS-CoV-2 specific VoC	Long COVID cohort n = 108	Control cohort n = 23
Pre-Alpha (31/01/2023-14/02/2021), n (%)	81 (75.00)	4 (17.39)
Alpha B.1.1.7 (15/02/2021-27/06/2021), n (%)	16 (14.81)	0 (0.00)
Delta B.1.617.2 (28/06/2021-19/12/2021), n (%)	5 (4.63)	1 (4.35)
Omicron (20/12/2021-Act), n (%)	3 (2.78)	3 (13.04)
No infection/No data, n (%)	2 (1.85)	15 (65.22)

2. Clinical symptoms of children with Long COVID

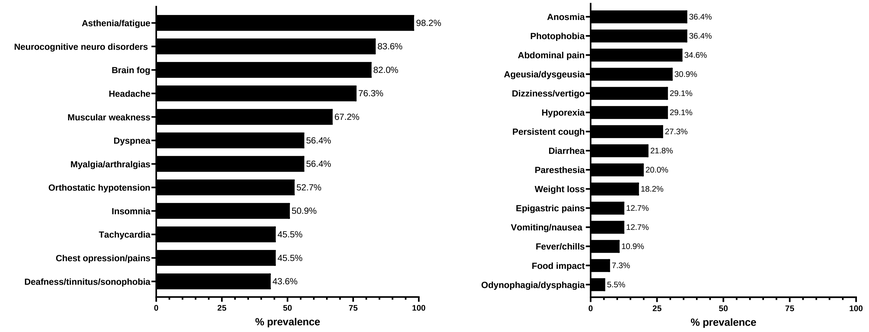


Figure 2. On the left, clinical symptoms of the Long COVID cohort above 40% of prevalence. On the right, clinical symptoms below 40% of prevalence.

3. Children and adolescents with Long COVID showed lower Anti-RBD IgG/IgA and neutralizing antibody levels

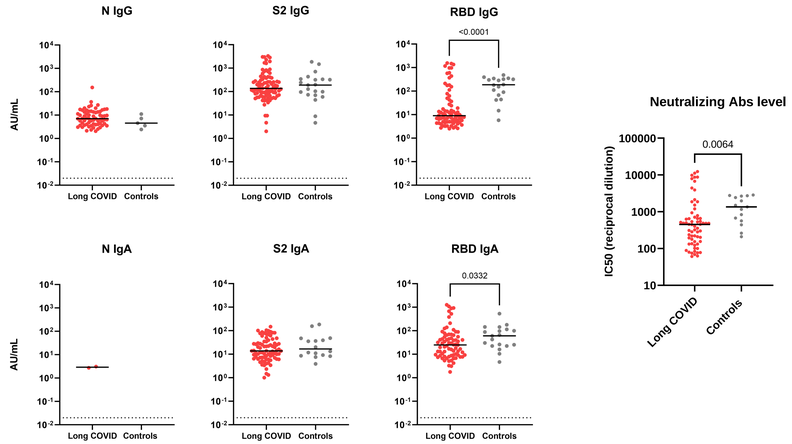


Figure 3. Children and adolescents with Long COVID had significant lower levels of both anti-RBD IgG and IgA antibodies compared to the Control cohort (p<0.0001 and 0.0332 respectively). Moreover, children and adolescents with Long COVID had significant lower levels of neutralizing antibodies against the D614G variant compared to the Control cohort (p=0.0064). Only responder individuals are plotted.

4. Are lower antibody titers due to lower SARS-CoV-2 antigen exposures?

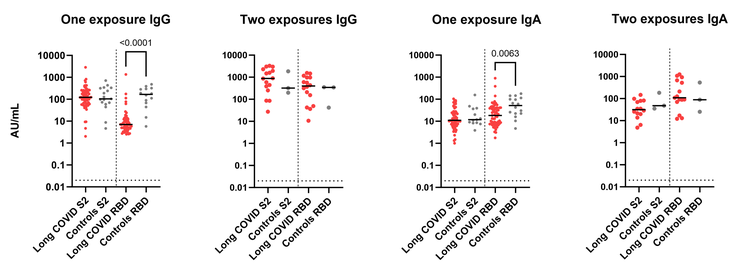


Figure 4. Children and adolescents of both cohorts were separated in two groups depending the exposures to SARS-CoV-2 antigen (one and two exposures). Both anti-RBD IgG and IgA antibody levels remained significantly lower in children and adolescents with Long COVID in the one exposure group (p<0.001 and 0.0063 respectively).

5. Are antibody titers dependent on time from last exposure?

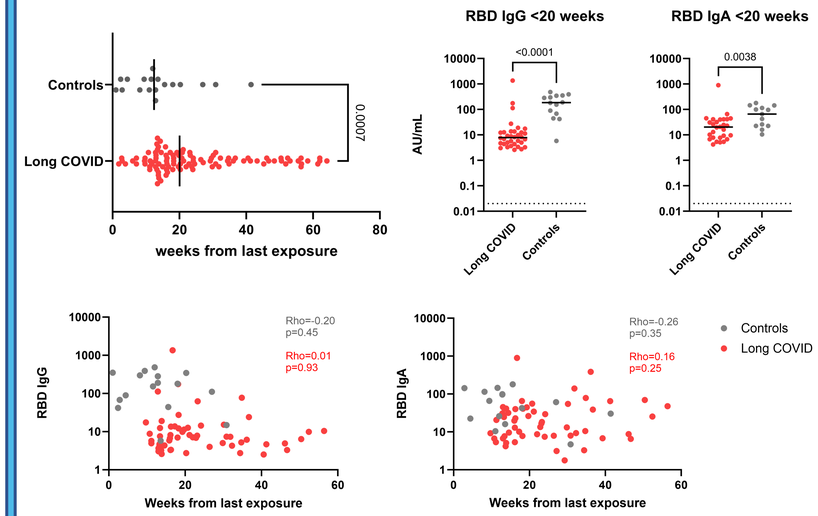


Figure 5. The control cohort had a sample collection time (median 12.4 weeks; CI 95% [10.5, 14.2]) closer to the last exposure to the antigen than the Long COVID cohort (median 20.1 weeks; CI 95% [16.4, 23.7]). However, both anti-RBD IgG and IgA antibody levels remained significantly lower in children and adolescents with Long COVID when comparing only the ones with less than 20 weeks from the last exposure and one exposure to SARS-CoV-2 antigen (both infection or vaccine). Moreover, there was no correlation between anti-RBD IgG/IgA levels and weeks from last exposure in both groups (Spearman).

CONCLUSIONS

- In our cohort, children and adolescents with Long COVID have **a lower antibody response against the RBD region** of SARS-CoV-2 spike, along with less neutralizing activity.
- Moreover, children and adolescents with Long COVID with **two exposures to SARS-CoV-2 antigen** had **similar anti-RBD antibodies** of those of the control cohort, suggesting a recovery after vaccination.
- Although time from last exposure was different between the two cohorts, being lower in the control cohort, we demonstrate that the **lower antibody levels against the RBD region were independent of time from last exposure.**
- We report for the first time antibody levels in children and adolescents with Long COVID. Lower anti-RBD antibody response could provide a **potential biomarker** for the diagnosis of Long COVID in the pediatric population.

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