Do Quantitative Levels of Anti-Spike-IgG Antibodies Aid in Predicting Protection from SARS-CoV-2 Infection? Results from a Longitudinal Study in a Police Cohort

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Abstract

Objectives In a COVID-19 sero-surveillance cohort study with predominantly healthy and vaccinated individuals, the objectives were (i) to investigate longitudinally the factors associated with the quantitative dynamics of anti-spike IgG antibody levels, (ii) to evaluate whether the antibody levels were associated with protection from SARS-CoV-2 infection and (iii) to assess whether the association was different in the pre-Omicron compared with the Omicron period. Methods The QuantiVac Euroimmun ELISA test was used to quantify anti-S1 IgG levels. The entire study period (16 months), the 11-month pre-Omicron period and the cross-sectional analysis prior to the Omicron surge included 3219, 2310 and 895 reactive serum samples from 949, 919 and 895 study participants, respectively. Mixed-effect linear, mixed-effect time-to-event and logistic regression models were used to achieve the objectives. Results Age and time since infection or vaccination were the only factors associated with a decline of anti-S1 IgG levels. Antibody levels were significantly associated with protection from SARS-CoV-2 infection, and the association was higher for the Omicron than for the Alpha and Delta variants. In a prediction model, it was estimated that >8000 BAU/mL anti-S1 IgG was required to reduce the risk of infection with Omicron variants by 20% to 30% for 90 days. Conclusions Anti-S1 IgG antibody levels are associated with protection from infection. The levels in the pre-Omicron periods were less significant than during the Omicron surge, which in turn required very high levels for protection in a statistical model.

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