Neutralizing Antibody Dynamics and Correlation with Anti-RBD IgG Levels after CoronaVac Vaccine and Booster Immunization in Healthcare Workers

Irmak Guzel, Gamze ÖZTÜRK, Ozgur Appak, Derya ÇAĞLAYAN, Ahmet Furkan SÜNER, Çağlar IRMAK, Neslişah ŞİYVE, Elif IŞIK, Muammer ÇELİK, Gül Ergör, Alp ERGÖR, Yücel Demiral, Sema Alp ÇAVUŞ, Bülent KILIÇ, and Ayca SAYINER

1TC Saglik Bakanligi Nusaybin Devlet Hastanesi
2Dokuz Eylul Universitesi Tip Fakultesi

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Abstract

Introduction: Vaccine-induced neutralizing-antibodies (NABS) are key for COVID-19 protective immunity. This study aimed to assess NABs-dynamics during nine-month follow-up period after primary CoronaVac vaccination and booster immunization and its correlation with anti-RBD-IgG levels to evaluate vaccination strategies. Material and Method: This prospective cohort study followed 226 healthcare workers who received double-dose CoronaVac at a university hospital. Serum samples were collected at four different time points after primary and booster (CoronaVac-BNT162b2) immunization. Antibody levels were assessed by SARS-CoV-2-IgG-II QUANT (Abbott, USA) and ACE2-RBD Neutralization Assay (Dia-Pro, Italy) tests. Factors affecting antibody response were analyzed. Statistical analysis was performed with IBM SPSS 22.0. Results: NABS were detected in 79.2% of participants one-month after the second-dose of CoronaVac but decreased to 48.8% by the fourth-month and was influenced by smoking, BMI and the presence of chronic diseases. Boosters regardless of type, significantly raised NAB levels. Heterologous vaccination yielded higher NAB and anti-RBD-IgG responses. Single or double-BNT162b2 boosters resulted in similar NAB responses. A strong correlation was found between anti-RBD-IgG response and NABS levels following CoronaVac vaccination, leading to the determination of predictive IgG thresholds for the presence of NAB. The type of booster influenced the correlation strength and threshold value. Conclusion: NABS levels drop rapidly after primary double-dose CoronaVac vaccination. Booster-doses significantly increase these levels while the combination of heterologous vaccines ensures a higher response. Anti-RBD-IgG levels can predict NAB response however the correlation varies by the type of vaccine, the strength of the resulting NAB response and the time since vaccination.

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