

## **Immunogenicity of SARS-CoV-2 vaccine with seasonal influenza and pertussis vaccines in pregnancy**

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### **Objective**

It is well known that the implementation of routine immunizations to prevent vaccine-preventable diseases has a significant impact on the health and well-being of infants, children, and pregnant women. We aimed to evaluate the influence of influenza, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine on the immunogenicity of SARS-CoV-2 vaccine among pregnant women, the priority population recommended for vaccination.

### **Methods**

We conducted a prospective study among pregnant women without previous SARS-CoV-2 infection in Taiwan. Maternal and umbilical cord blood samples at delivery were analyzed for the percentage of inhibition of neutralizing antibodies (NAbs) against the original strain, Delta, and Omicron variants of SARS-CoV-2 as well as the total antibody to the SARS-CoV-2 spike protein. We examined the association between different doses of SARS-CoV-2 vaccine in combination with influenza and Tdap vaccination, and two-dose SARS-CoV-2 vaccination with or without influenza and Tdap vaccines via a two-sample t-test. Results of  $p < 0.05$  were considered to be statistically significant.

### **Results**

98 pregnant women were enrolled in our study, with 32 receiving two doses of SARS-CoV-2 mRNA-1273 vaccine, 60 receiving three-dose of mRNA-1273, and 6 receiving one-dose of ChAdOx1 and two-dose of mRNA-1273. Twenty-one participants were immunized with SARS-CoV-2, influenza, and Tdap vaccines. Of these 21 individuals, there were no significant NAbs levels in maternal and cord blood samples against the Omicron variant, regardless of doses or type of SARS-CoV-2 vaccine. However, antibody responses against the wild-type and Delta variant were significantly lower in all maternal sera in the two-dose SARS-CoV-2 vaccine group. Among 32 women receiving two-dose mRNA-1273, significantly lower levels of NAbs in maternal sera were observed against the Delta variant and total antibody both in maternal sera and cord blood were observed in individuals receiving SARS-CoV-2 and influenza vaccine.

### **Conclusion**

This is the pilot study to demonstrate the effects of influenza and the Tdap vaccine on the immunogenicity of the SARS-CoV-2 vaccine among pregnant women. These results suggest that combination vaccination during pregnancy may result in immunogenic interactions.