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A Commentary on: Immunogenicity and Safety of a Recombinant COVID-19 Vaccine as Heterologous Booster After Priming with Inactivated Vaccine in Healthy Children and Adolescents Aged 3-17 Years: An Open-labeled, Single-arm Clinical Trial

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Abstract

World Health Organization and U.S. Centers for Disease Control and Prevention have issued guidance to encourage booster immunization due to declining antibody level of population who completed primary vaccination and the emergence of new variants. In this commentary, several important insights and findings from a clinical trial of a heterologous booster recombinant protein vaccine in children aged 3-17 years would be summarized: Booster immunization in minors could induce a satisfactory immune response; the level of neutralizing antibody induced by heterologous booster immunization was superior to that of homologous booster immunization. These findings would expand the application of booster immunization and provide reference for the formulation of relevant immunization strategies.

Keywords: COVID-19; Vaccine; Booster immunization; Minor

About the Study

Coronavirus disease (COVID-19) vaccines usually could induce acceptable neutralizing antibody response at first two weeks, and the neutralizing antibody level would gradually decline to undetected level within 6 months [1]. Guidelines from World Health Organization and U.S. Centers for Disease Control and Prevention encouraged booster immunization in adults, but did not recommend it for minors due to the lack of relevant data [2, 3]. This commentary focused on the insights and findings of heterologous booster vaccination with one dose of recombinant COVID-19 vaccine (ZF2001) in children aged 3 to 17 years who had received two doses of inactivated vaccines.

First, an important finding was that a booster schedule in minors could induce robust immune responses and provide a certain degree of cross-protection against Omicron variants. Some other studies also certified it [4, 5]. This finding was significant to minors for improving the immune persistence and the resistance to new variants. Booster immunization could also produce immune responses in minors with Inborn Errors of Immunity (IEIs) [6]. One study showed that the neutralizing antibodies and T-cell responses in adolescents were non-inferior to those in adults and another study indicated that minors could produce more robust immune response than adults after booster immunization [7, 8], although there were some limitations for this comparison, such as the level of antibody before booster immunization, the difference on laboratory selections or detection methods in different studies.

Second, we found that heterologous booster immunization resulted in better levels of neutralizing antibodies than homologous booster immunization in minors. And it was adherence to the result of another study, which indicated that homologous booster immunization induced less immune response than heterologous booster immunization with adenovirus vector vaccine in children aged 6-17 years who had received two doses of inactivated vaccine [5]. These results were similar to trial in adults and it might be attributed to the recall of memory B cells and the de novo activation of B cells [9, 10].

Finally, heterologous booster immunization with one dose of ZF2001 in minors showed a satisfactory safety profile and there was no significant difference for overall safety results between homologous boost and heterologous boost of recombinant protein vaccine in minors [4]. The heterologous booster dose did not significantly increase the risk of adverse reactions. However, under intramuscular injection, the incidence of adverse reactions of viral vector vaccine was higher than that of inactivated vaccine in minors when applied as heterologous booster [5]. Similar trends have been observed in studies involving adults, in which the incidence of adverse reactions of viral vector and mRNA vaccines was slightly higher than recombinant protein vaccines as heterologous booster doses [11, 12].

Could booster immunization programs in minors improve neutralizing antibody levels? The answer is yes. The ideas and findings of this article were significant for improving the persistence of immunity in minors and preventing emerging variants infections. This would help to expand the application of booster immunization strategy and provide reference for the development of related immunization strategies.

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