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INTRADERMAL AND INTRAMUSCULAR ADMINISTRATION OF THE BOOSTER COVID-19 VACCINATION

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BACKGROUND

The 2-dose primary series COVID-19 vaccination is not sufficient to prevent SARS-CoV-2 variants infection, particularly when using the lower immunogenic vaccines. A booster (3rd dose) is now recommended to enabling variants cross-protection. Intradermal route is highly immunogenic and would increase accessibility in the time of vaccine shortage. We studied intradermal booster vaccination following CoronaVac (inactivated vaccine by Sinovac) or ChAdOx1 (adenoviral vector vaccine by AstraZeneca) primary series.

METHODS

This prospective study conducted in volunteers who had received 2 doses of CoronaVac and ChAdOx1 for 8-12 weeks earlier. We evaluated the immunogenicity of a booster vaccination by intramuscular administration (IM) of ChAdOx1, BNT162b2 [15 µg], and BNT162b2 [30 µg]; and compare these with the 1/5 IM doses by intradermal (ID) route of ChAdOx1 ($1x10^{10}$ viral particles, 0.1 ml) and BNT162b2 [5 µg]. The level of anti-SARS-CoV-2 receptor binding domain (RBD) IgG were measured by chemiluminescent microparticle immunoassay (CMIA; Abbott Laboratories Ltd.) on the day of booster vaccination and 14 days after. (Ethical Approval: Si537/2021 and Si635/2021, TCTR 20210719006 and 20210907003)

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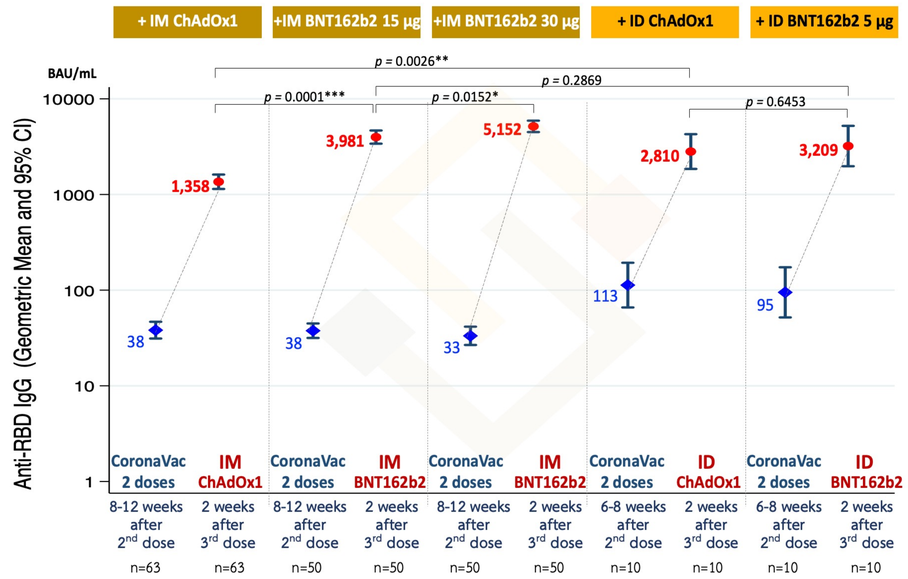


Figure 1. Quantitation of anti-SARS-CoV-2 RBD IgG following CoronaVac primary series and booster

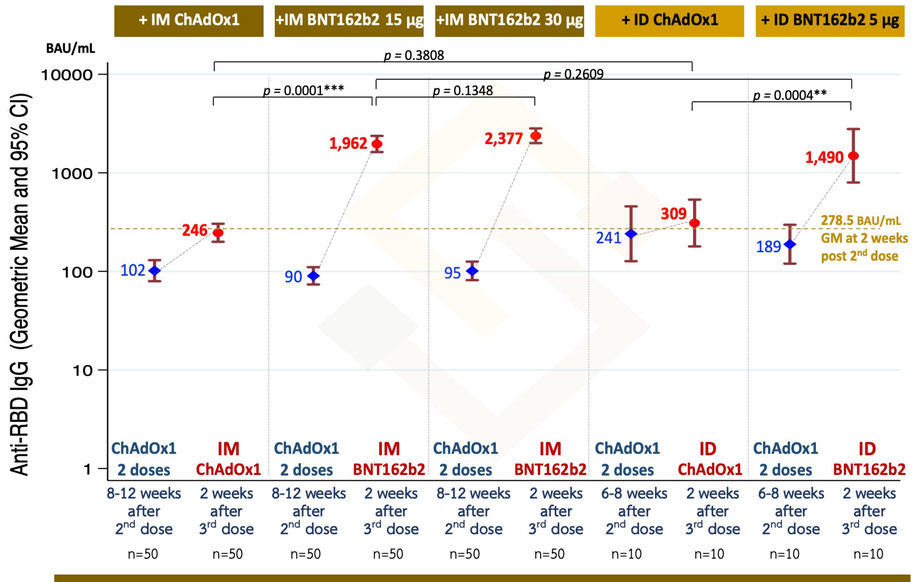


Figure 2. Quantitation of anti-SARS-CoV-2 RBD IgG following ChAdOx1 primary series and booster

RESULTS

- Among those previously received 2-dose CoronaVac, ID ChAdOx1 booster induced higher geometric mean anti-SARS-CoV-2 RBD IgG concentration (GMC) than IM route, while ID BNT162b2 induce lower GMC than IM route; however, at the level close to 15 µg BNT162b2 IM (**Figure 1**).
- Among those previously received 2-dose ChAdOx1, ID ChAdOx1 booster induced similarly low GMC as IM route. The ID BNT162b2 induced lower GMC than IM route, but not significantly different from GMC following 15 µg BNT162b2 IM (**Figure 2**).
- The IM 30 µg-BNT162b2 induced higher GMC than 15 µg-BNT162b2 following both primary series groups. Homologous ChAdOx1 as the booster following 2-dose ChAdOx1 primary series by either route was ineffectively induced anti-RBD IgG.
- Local adverse events (AEs) were reported more frequent in ID route; however, systemic AEs were less. There was no severe AE reported.

CONCLUSIONS

- The immunogenicity of heterologous boosting with ID BNT162b2 was high in both CoronaVac- or ChAdOx1-prime groups but was slightly lower than IM route.
- ChAdOx1 boosting by ID route shows higher immunogenic than IM route in those primed with CoronaVac-prime. However, neither ID or IM route was optimally immunogenic in ChAdOx1-prime.
- Intradermal route using 1/5 of IM dosage is immunogenic with less systemic AEs and may be an option for booster in time of vaccine shortage.