Effect of BNT162b2 antigen dosage on protection against SARS-CoV-2 omicron infection

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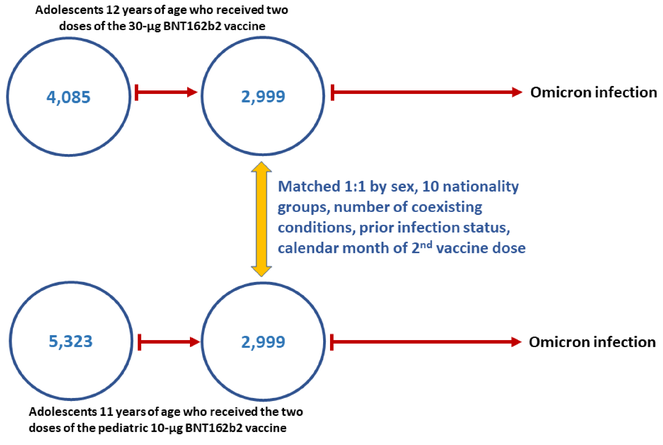
BACKGROUND

Coronavirus Disease 2019 (COVID-19) vaccine antigen dosage may affect protection against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, but direct evidence to quantify this effect is lacking.

METHODS

- A matched, retrospective, cohort study emulating a randomized control trial was conducted in Qatar between February 3, 2022 and November 8, 2022.
- The study provided a head-to-head comparison of the protection induced by two antigen dosages of the BNT162b2 vaccine (30 µg vs 10 µg; Figure 1).
- Associations were estimated using Cox proportional-hazard regression models.

Figure 1. Illustration of study design for comparing protection of the 30 µg BNT162b2 to that of the 10 µg BNT162b2

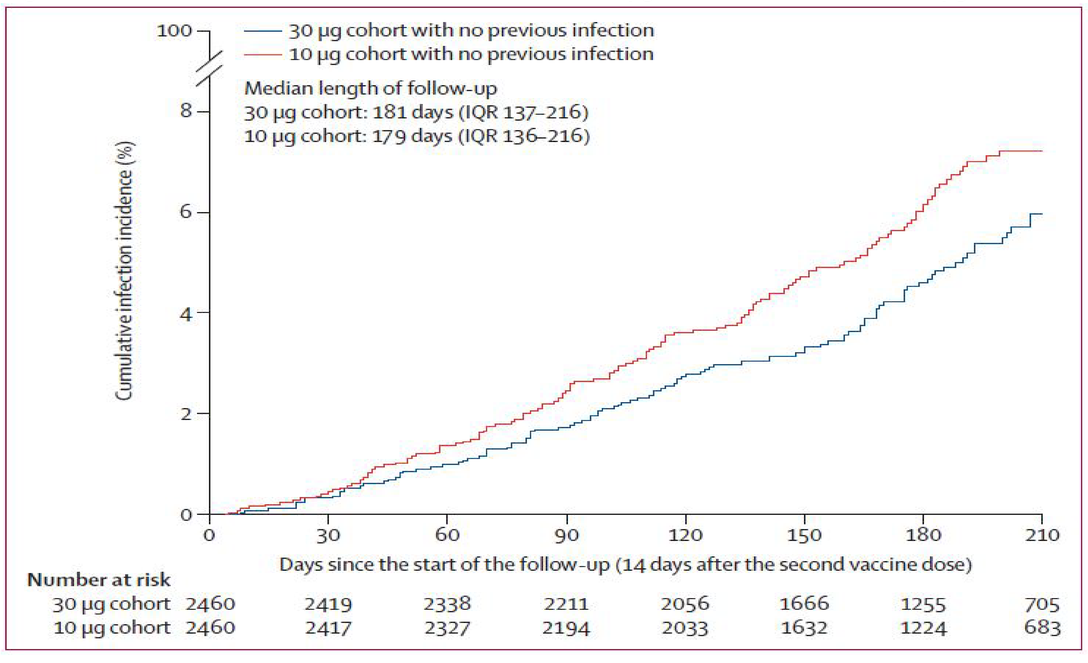


Three-fold higher BNT162b2 dosage was associated with ~25% higher protection against infection in infection-naïve adolescents of similar age.

RESULTS

- For infection-naïve adolescents, cumulative incidence of omicron infection 210 days after the start of follow-up was (Figure 2):
  - 6.0% (95% CI: 4.9-7.3%) for the 30 µg cohort
  - 7.2% (95% CI: 6.1-8.5%) for the 10 µg cohort
- Incidence during follow-up was dominated by omicron subvariants including, consecutively, BA.1/BA.2, BA.4/BA.5, BA.2.75*, and XBB.

Figure 2. Cumulative incidence of omicron infection in the 30 µg cohort versus that in the 10 µg cohort



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RESULTS (ct'd)

Infection-naïve adolescents:

- Adjusted hazard ratio (30 µg vs 10 µg): 0.77 (95% CI: 0.60-0.98)
- Effectiveness: 23.4% (95% CI: 1.6-40.4%).

Prior infection adolescents:

- Adjusted hazard ratio (30 µg vs 10 µg): 1.50 (95% CI: 0.72-3.12)
- Effectiveness: -33.3% (95% CI: -68.0-27.5%)

CONCLUSIONS

- A three-fold higher BNT162b2 dose was associated with higher protection against infection in infection-naive adolescents of similar age.
- This finding is consistent with observed differences in SARS-CoV-2 neutralizing titers after each antigen dose.
- Effect size (~30%) is similar to that observed for protection of the mRNA-1273 vaccine compared with the BNT162b2 vaccine where difference is dose is also about three-fold.

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