Vaccine plus previous infection: protection during the Omicron wave in Brazil

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By April 7, 2022, 495 million individuals have been infected by SARS-CoV-2, and at least 11 billion COVID-19 vaccine doses have been administered worldwide[1]. Therefore, understanding hybrid immunity (infection plus vaccination) is crucial to guide vaccination policies. We have demonstrated that hybrid immunity offered additional protection during the Gamma and Delta waves in Brazil [2]. With the emergence of the Omicron variant, vaccine effectiveness (VE) seems to decay[3,4], but the protection in previously infected vaccinees remains unknown. Here, we analyzed the impact of hybrid immunity in preventing infection and severe outcomes during the circulation of the Omicron variant in Brazil.

Using national databases, we performed a test-negative case-control study as previously described[2]. Cases and controls were defined as individuals with RT-PCR/Lateral-flow tests positive or negative, respectively, between January 01 and March 22, 2022, a period of predominant circulation of the Omicron variant (Appendix pg 3-4). The severe outcomes (hospitalisation or death) were defined as: a positive test obtained from 14 days before to 3 days after hospital admission; death occurring within 28 days after a positive test. We analyzed VE in previously infected vaccines using two references groups: unvaccinated with or without pre-infection. Detailed methods are in Appendix page 2.

A total of 918,219 tests (899,050 [97.9%] individuals) were included, 476,901 (51.9%) cases, and 441,318 (48.1%) controls, and 323,704 (35.2%) were unvaccinated (22,935[2.4%] with and 300,769 [32.8%] without pre-infection) (Appendix:pg 4-6). Compared to unvaccinated without pre-infection, the effectiveness of the previous infection in preventing reinfection during the Omicron period was low (28.9%, 95% confidence interval [CI] 26.9-30.9), increasing with vaccination with any vaccine type (Ad26.COV2.S, BNT162b2, ChAdOx-1 or CoronaVac), especially after the booster, although with waning. Protection against severe outcomes after a previous infection was elevated (85.6%, 95%CI 82.7 to 88.0), increasing with vaccination, ranging from

88.0 to 100%. Compared to unvaccinated with pre-infection, hybrid immunity showed a modest increase in protection against symptomatic infection waning over time and substantial protection against severe outcomes after the booster (Figure 1/Appendix:pg=7-9). Similar results were obtained using the matched design (Appendix:pg=10-12).

In conclusion, during the Omicron dominant period in Brazil, robust protection against severe disease was offered by the previous infection and increased with hybrid immunity. However, against symptomatic infection, even boosted individuals with hybrid immunity showed a tendency of waning. Booster doses in previously infected individuals offered a moderate but transient gain in protection against symptomatic infection and a slight improvement against severe outcomes.

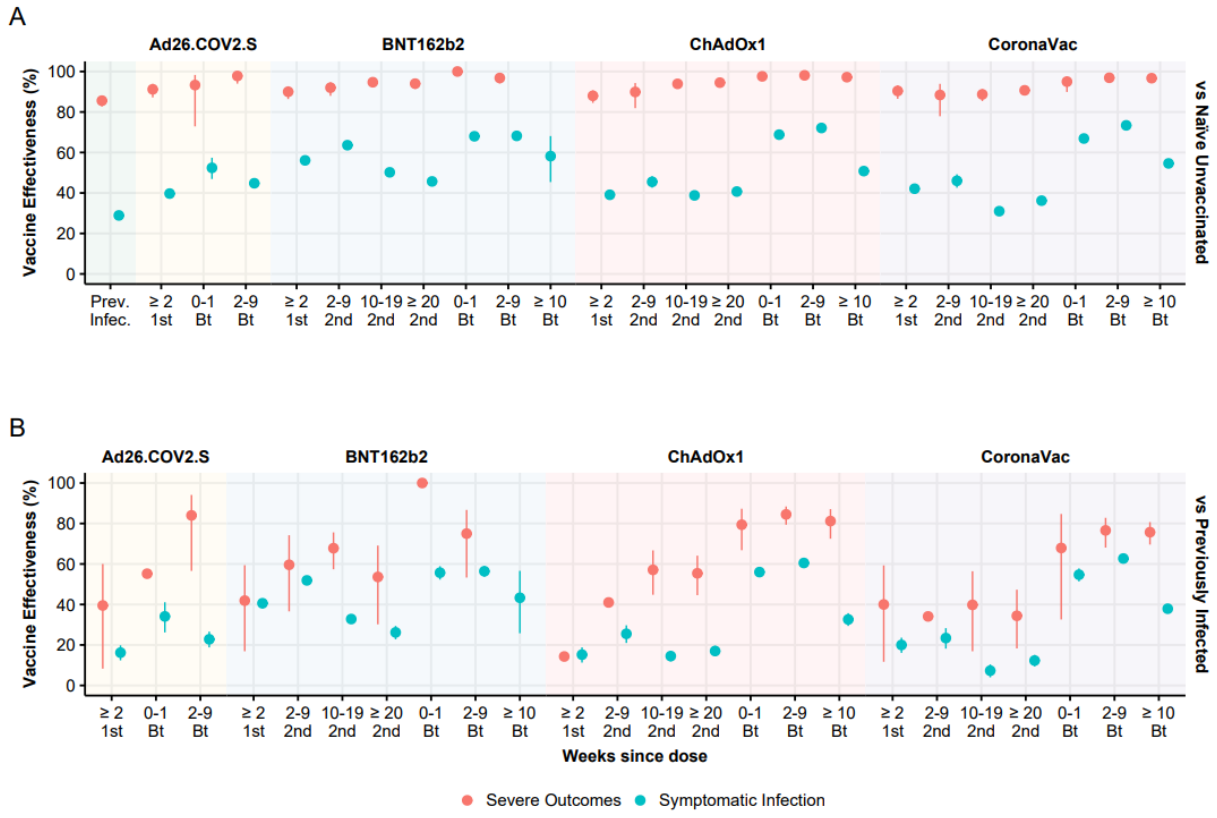

Figure 1: Effectiveness of hybrid immunity against SARS-CoV-2 symptomatic infection and severe outcomes, compared to individuals unvaccinated without previous infection (naïve unvaccinated) and those unvaccinated with the previous infection (Previously Infected). 1st= First dose, 2nd= Second dose, Bt= Booster dose. To ensure reasonable precision, estimates are shown when there were at least 20 cases or 1000 controls for symptomatic infection and 10 cases or 500 controls for severe outcomes.

REFERENCES

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