

NATURAL AND VACCINE-INDUCED IMMUNITY ARE EQUIVALENT FOR THE PROTECTION AGAINST SARS-COV-2 INFECTION

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Introduction

Real-life evidence has consistently shown that both natural immunity acquired after SARS-CoV-2 infection [1] and induced immunity acquired by anti-COVID-19 vaccines [2] have protective action against SARS-CoV-2 infection. Nevertheless, few studies have directly compared the protection given by natural and induced immunity, generating inconsistent findings [3,4].

Aims

To compare the risk of SARS-CoV-2 infection associated with natural and vaccine-induced immunity.

Methods

This is a retrospective population-based cohort study based on registry of COVID-19 vaccinations and SARS-CoV-2 infections among 9.1 million citizens of Lombardy, Italy, eligible for vaccination on 27th December 2020. Those who developed SARS-CoV-2 infection from 24th May to 14th September 2021, provided they did not yet receive the COVID-19 vaccine when infection was confirmed, and those who received the second mRNA vaccine dose, provided they had not yet developed the infection, were selected to be 1:1 matched for sex, age and index date. The latter corresponded to 90 days after confirmed infection or 14 days after vaccine administration. A control cohort including citizens who, on the index date, had neither developed infection nor received vaccination was also selected. Kaplan–Meier curves were used for comparing the cumulative incidence of new SARS-CoV-2 infection from the index date until 22nd June 2022.

Results

The study cohort included 22,471 citizens exposed to natural immunity. Among them, 19,418 contributed to form as many 1:1:1 sets of citizens who had experienced natural exposure, vaccine-induced exposure, and no exposure. The mean age of the cohort was 32.6 years and 51.9% were male.

During a median follow-up of 4.9 months, 9,738 new infections occurred. The cumulative risk of developing a new infection is shown in Figure. The risk was similar between infected and vaccinated subjects, but it was considerably higher among controls ($p < 0.001$). Among the latter, the risk steadily increased over time, reaching a value of 25.9% at the end of follow-up. Conversely, the trend of the cumulative risk among infected and vaccinated individuals was very similar, being negligible after the first month of follow-up and increasing afterward, reaching values of 21.8% and 22.0%, respectively, at the end of follow-up.

During the period in which the delta variant was dominant, exposure to natural and vaccine-induced immunity were associated with a reduction of the risk of SARS-CoV-2 infection of 0.79 (95% CI 0.62 to 0.89) and 0.81 (95% CI 0.65 to 0.89), respectively (p -value of homogeneity of odds ratios < 0.001). During the period in which the omicron variant was dominant, the corresponding risk reductions were 0.17 (95% CI 0.11 to 0.23) and 0.18 (95% CI 0.13 to 0.23), respectively, (p -value of homogeneity of odds ratios < 0.001).

Conclusions

Our study did not offer evidence that immunity due to SARS-CoV-2 infection and that induced by complete (two-dose) anti-COVID-19 vaccination act differently in conferring protection against the risk of new SARS-CoV-2 infection. Conversely, both natural and induced immunity offer significant protection when compared to individuals who did not have COVID-19 immunity.

References

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Figure 1. Cumulative risk of developing a new SARS-CoV-2 infection by exposure status.

