Omicron and other variants of SARS-CoV-2 roles of vaccines and herd immunity in protecting from the emerging strains

Dear Sir,

Over two years have passed since the first new coronavirus infections were discovered in China's Wuhan province. Since then, efforts have concentrated on preventing and limiting transmission throughout the early phases of the epidemic. Global herd immunity studies in COVID-19 have shown an urgent need for effective COVID-19 vaccinations. The articles by Juyal *et al.* and Raina & Kumar on the COVID-19 immunization status in India caught our attention.[1,2] While the vaccination drive in India has indeed been one of the most incredible drives in history, the efficacy and effectiveness of the vaccines are still yet to be reported. Omicron, a novel SARS-CoV-2 variant of concern (VoC), was recently identified in South Africa.[3] The advent of the alpha, beta, and delta SARS-CoV-2 VoCs was linked to new waves of infections, spanning the entire globe, including India.[4] Because the emergence of new strains of this deadly virus is inevitable, dealing with the current pandemic while dealing with the added difficulties of emerging strains is a monumental task.

Antibody therapies and vaccinations are among the last lines of defence against the growing COVID-19 pandemic. Mutations are insurmountable and will have an impact on vaccines and antibodies in development as well as those in use.[5] Although COVID-19 vaccinations are useful, none of them is fully successful in preventing COVID-19. A small percentage of the fully immunized population will still become ill with COVID-19 disease to variable degrees, more or less with the mutated strains.

Although there are conflicting reports on whether COVID-19 vaccinations have consistently maintained high efficacy for each of the four VoCs preceding omicron, clinical trials have shown reduced efficacy for some vaccines in transmission circumstances where the beta variation is prominent. Previous variants reduced vaccine efficacy; for example, the ChAdOx 1 vaccine was 70% effective in preventing clinical infections in the UK for the D614G variant, whereas this efficiency dropped to 10% in South Africa for the beta variant.[6] The efficacy of the BNT162b2 vaccination in preventing clinical infections, on the other hand, was maintained across both the D614G and beta versions.[6] Because omicron contains a greater number of mutations than earlier VoCs, it is uncertain how it may affect the clinical efficiency of COVID-19 vaccines for mild disorders. After the introduction of the delta strain, a study conducted in India during the second wave of COVID-19 vaccinations demonstrated a considerable drop in the effectiveness of COVID-19 vaccines.[7]

Aside from vaccination, cross-immunity across strains will be crucial in the future. Persons infected with SARS-CoV-2 who have pre-existing cross-reactive CD4+ memory T-cells are expected to have the following results when compared to infected individuals without such memory. When compared to persons without pre-existing cross-reactive cells, there is a reduction in the severity and duration of symptomatic/clinical illness.[8] A study conducted during the fourth wave of COVID-19 in Japan discovered that the cross-neutralizing activity of convalescent sera was protective against all variants except one. The significant neutralizing activity may produce a conformational shift in the virus's spike protein, affecting immunological identification of the same. According to the findings of the study, those who recover from COVID-19 may be protected against the severity of infection with newer developing variations.[9] Another study's findings suggest considerable decreases in cross-neutralization but not full effacement. These findings help us better comprehend the new SARS-CoV-2 mutations that are threatening to aggravate the COVID-19 pandemic.[10] Because T-cell immunity varies spatially and influences transmission, extrapolating epidemiological characteristics across populations may not be completely accurate.

The existence of cross-immunity is thought to result in a milder course of illness and provide the host time to establish adaptive immunity to eliminate the virus. The presence of a significant number of asymptomatic or mild cases, a low infection-fatality ratio, and a fairly flat curve of proportion positivity of cases in proportion with total testing, both in phases of strict lockdown and step-wise unlocking, all point to the interplay of cross-immunity and herd immunity in the COVID-19 scenario in India. Cross-immunity seems to have resulted in a quicker formation of herd immunity.[11]

In conclusion, we must maintain and expand our vaccine campaign because although it may not prevent infection, it can reduce the severity of illness. Vaccinations, in turn, provide herd immunity to the community, reducing the likelihood of a VoC outbreak. More study is needed to determine the efficacy of vaccination against VoCs.

TWO Conclusive statements are needed.

Ethical declaration

Ethics approval is not required.

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Conflicts of interest

There are no conflicts of interest.

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