Cross-neutralization of Influenza viruses by SARS-CoV-2 antibodies

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CONTENTS

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Background

- COVID-19 precautions and community mitigation successfully prevented and modified the spread and seasonal pattern of respiratory infections

- Limited data from several countries suggested reduced seasonal influenza viruses' circulation. The scenario was the same in Bangladesh also

- Here, we tried to explained this abnormality as similar epitopes on viruses called cross-reactive epitopes (CREs) shared by influenza hemagglutinin and SARS-CoV-2 S protein could result in immune evasion or viral neutralization

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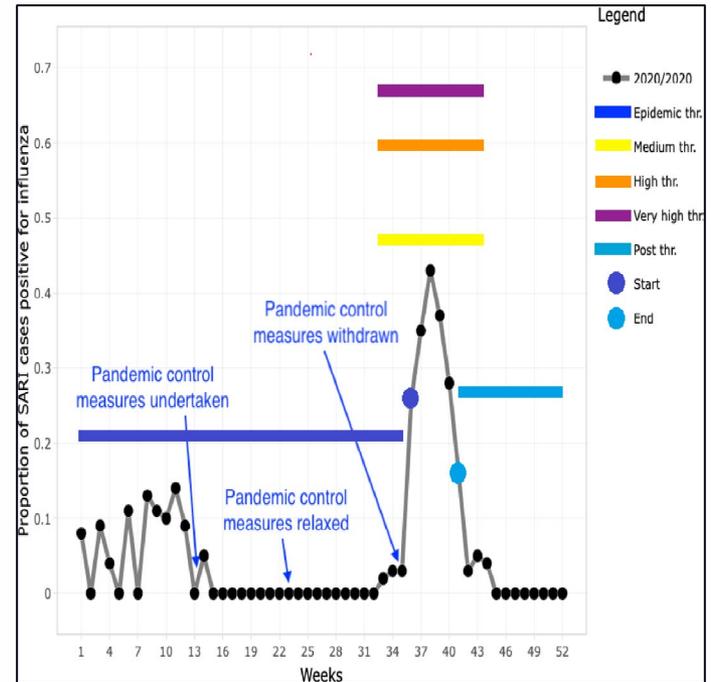
Cross Reaction or Neutralization

➢ is the protection conferred on a host by infection with one virus (e.g., SARS-CoV-2), which prevents infection by a closely related virus (e.g., Influenza)

➢ Recently, Cross protection was observed among different viruses like SARS-CoV-2, Dengue and HIV

➢ This can be a great approach for drug developments

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Objectives

Determine the prevalence of Influenza strains in the SARS-CoV-2 samples

Investigate the cross-reactivity of anti-SARS-CoV-2 antibodies with the influenza viruses

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RESEARCH METHODOLOGY

Study Participants and ethics statement

Detection of influenza-specific neutralizing antibodies
(HAI)

Assessment of SARS-CoV-2-Specific Antibodies
(ELISA)

Determination of SARS-CoV-2 neutralizing antibodies.
(PNA)

Detection of antibodies that blocked influenza Infection
(MN)

Statistical analysis

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Findings

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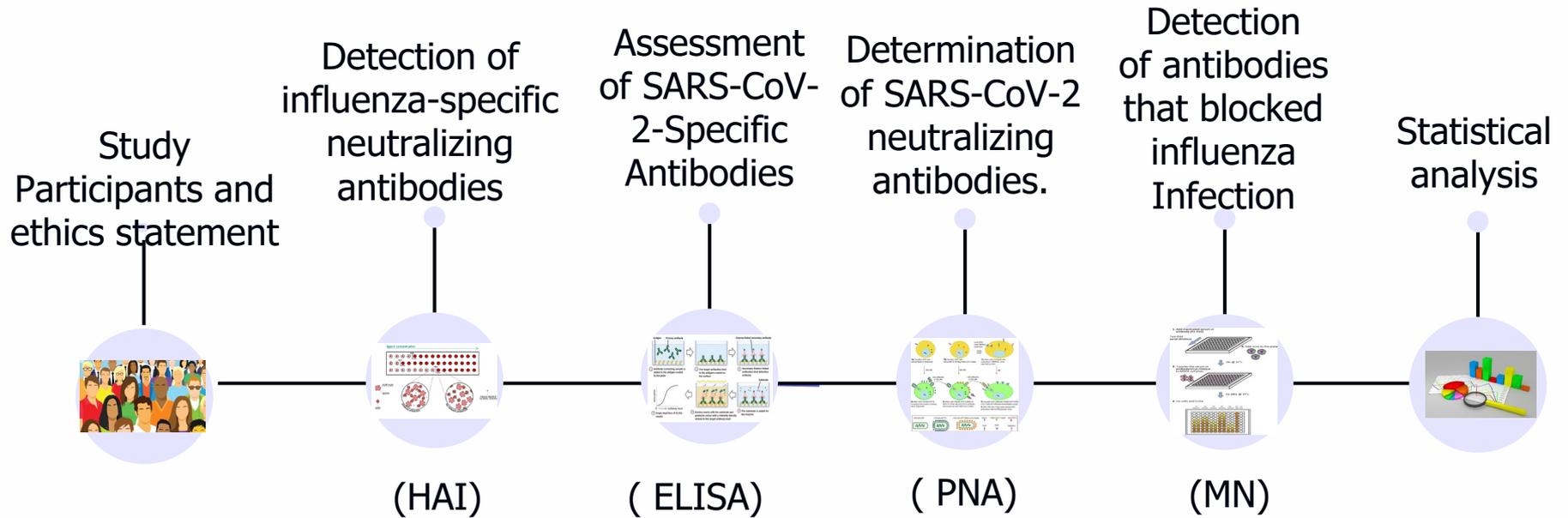
Summary

➢ Among all, 94% have antibodies against the SARS-CoV-2 spike protein

➢ Interestingly, all found to have antibodies against Influenza B
    ➢ 95% have antibodies against Influenza A,
    ➢ and 53% have antibodies against both Influenza A and B strains (H1N1, H3N2, and B)

➢ Only 16 samples didn't contain antibodies against Influenza A strains (H1N1 and H3N2)

➢ Amazingly, among the 16 samples, 5 samples have high (MN titer≥20) & 6 samples have moderate (MN titer≥10) capability to neutralize Influenza A

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Detection of anti-SARS-CoV-2 and anti-Influenza Antibodies
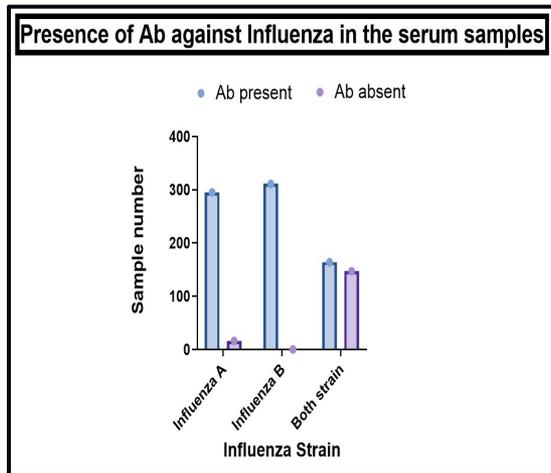

Quantitative ELISA
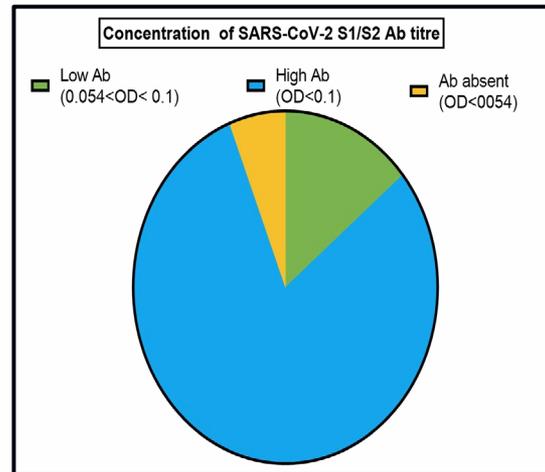
Quantitative ELISA
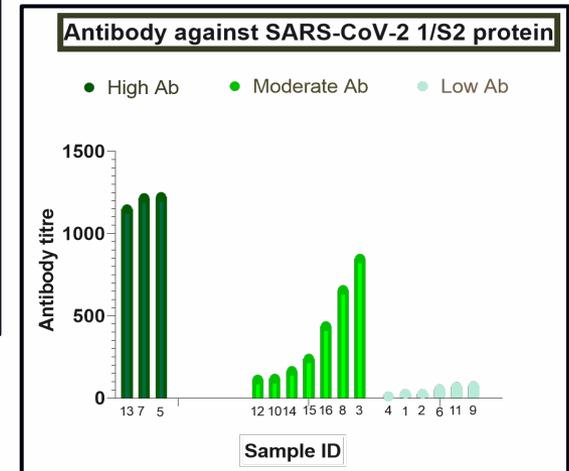
Qualitative ELISA

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Titre of Neutralizing Antibodies against SARS-CoV-2 and Influenza A
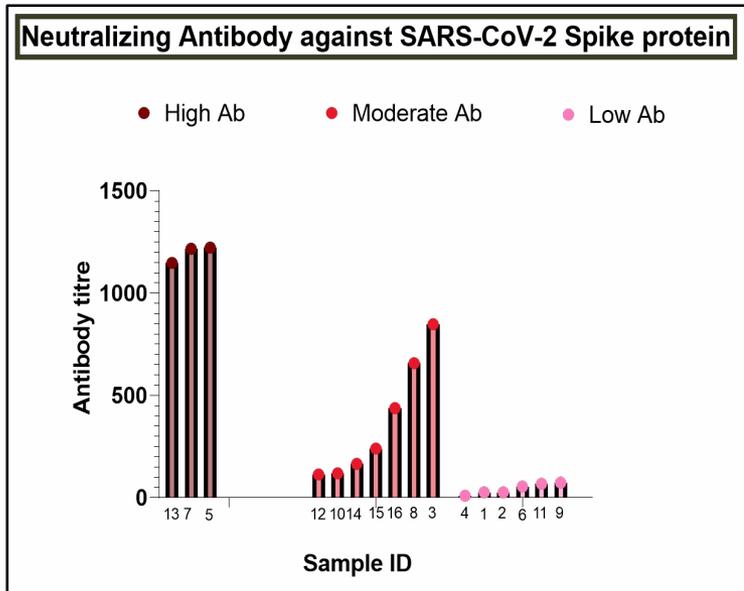
Pseudovirus Neutralization Assay (PNA)
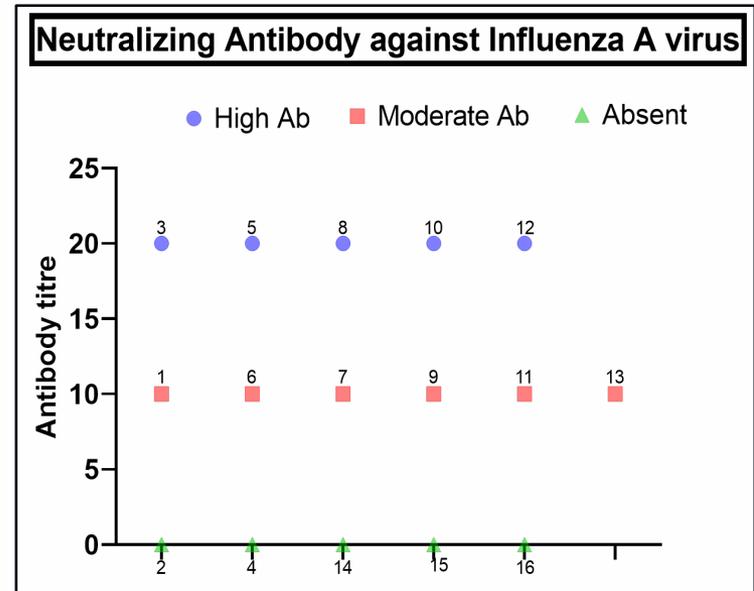
Micro-Neutralization Assay (MNA)

Conclusion
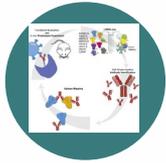
Neutralizing SARS-CoV-2-directed antibodies cross-react with the Influenza A virus

The circulation of seasonal influenza is reduced and shifted because of this cross reactivity

No scientific research has yet been published explaining the mechanism behind this cross-protection
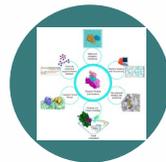
Protein structure (antigenic) similarities, regardless of genetic distance, could predict cross-reactivity between viruses from distant phylogenetic lineages

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Impact of this study

➢ Investigation of this cross-reactive neutralization epitopes of antibodies generated in divergent viral infections can provide key evidence for engineering so-called super antibodies (antibodies that can potently neutralize diverse pathogens with similar antigenic features).

➢ Generating libraries using the starting sequence of such cross-reactive antibodies using approaches such as rapid affinity maturation can provide candidate antibodies in a short frame of time upon which synthetic variants can be generated in the face of future pandemics.

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Thank You

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