A REVIEW OF THE RISKS OF SARS-COV-2 INFECTION IN THE SELECTIVE IGA DEFICIENCY PATIENT POPULATION

Hannah R. Mathew[1], Marvin J. Fritzler[1], May Y. Choi[1]
[1] Cumming School of Medicine, University of Calgary, Calgary, Canada

Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and the development of COVID-19 are characterized by clinical features such as dry cough, fever, dyspnea and myalgias. Selective immunoglobulin A (IgA), which is critical for mucosal immunity, is regarded to be the most common primary immunodeficiency condition (e.g. prevalence range 1/100 to 1/1000). Hence, it is important to know whether patients with selective IgA deficiency are at higher risk of SARS-CoV-2 infection.

Objective

This investigation examined the reported prevalence of SARS-CoV-2 infection in patients with selective IgA deficiency and reviewed the systemic functions of IgA and its significance in the exclusion of viral pathogens that may impact their risk of SARS-CoV-2 and COVID-19 infection.

Methods

A literature search was performed using PubMed (March 28 to June 18, 2020). Both primary and secondary literature were included. Key search terms included "(Secretory) IgA", "Selective IgA Deficiency", "SARS", "SARS-CoV-2", "COVID-19", "viral", and "respiratory". Publications were selected by their relevance to IgA, especially regarding respiratory viral infection and COVID-19.

Results and Discussion

- 19 papers were included on IgA humoural profiles in COVID-19 cases and/or the functions of IgA isoforms, especially in the airway

IgA Deficiency and COVID-19

- No reported cases of selective IgA deficiency with COVID-19
- In a study of 15 human milk samples acquired from donors post-SARS-CoV-2 infection, 80% displayed IgA reactivity and were positive for secretory antibody reactivity (Fox et al., 2020).

Mechanisms of IgA in Lung Defense

- IgA activates the alternative complement pathway and impeded the binding of viral pathogens to the respiratory epithelial cells.
- IgA antibodies are generally self-sufficient to effectively defend against viral pathogens acquired through the oral, nasal and gastrointestinal passages.
- Secretory IgA is constitutively present in mucosal surfaces and produced locally, rendering it available to neutralize almost all pathogens attempting to initiate contact with host cells.
- Secretory IgA appears to have prime significance in immune exclusion of pathogens, especially in the respiratory system, as it is the major immunoglobulin isotype in airway secretions

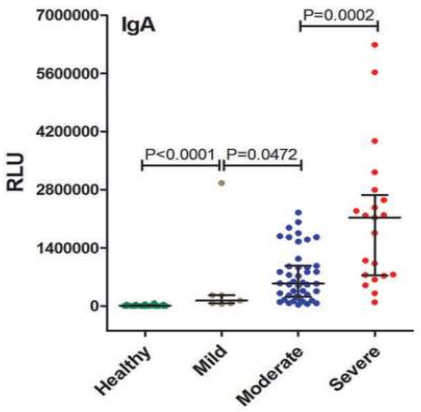

Fig 1. Serum IgA levels in healthy controls (n = 330), mild (n = 7), moderate (n = 44) and severe (n = 21) COVID-19 patients (Ma et al. Cellular & Molecular Immunology 2020).

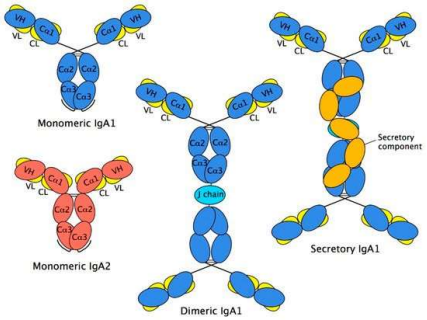

Fig 2. IgA isoform structures. Blue and red mark heavy chains, and yellow marks light chains (de Sousa-Pereira and Woof, Antibodies 2019).

Conclusions

- Although selective IgA deficiency patients at first appear to be at an increased risk of SARS-CoV-2 infection due to the presumed altered IgA protective functions against viral pathogens, there were no reported cases
- The possibility for sufficient production of the secretory IgA isotype in respiratory mucosal surfaces may be effectively compensatory, especially in asymptomatic individuals
- The secretory isotype appears to have prime significance in immune exclusion of microbial pathogens
- Data suggests there is a significant secretory IgA-dominant SARS-CoV-2 immune response in human milk post-infection in most individuals
- Future studies to test for the presence of secretory IgA in selective IgA deficiency patients, beyond the traditional serum sample analysis, are needed

References

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