

Paediatric Review on Corona Virus (COVID-19)

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Received: February 17, 2020; **Published:** February 29, 2020

Corona Virus (COVID-19) is an RNA virus that has been affecting the global scenario for quite some time since the December of 2019. Prior to the S.A.R.S. outbreak (2002 - 2003), the coronavirus was deemed classically as a causative agent of the common cold with clinical features close to that of rhinoviruses (Harrison's Infectious Diseases, 3rd edition).

As of 2019 - 2020 the paediatrics cases being presented as infected is a notable group that is still under review and study [1].

Although there is a dearth of data, Children are easily affected by the virus as much as an adult. Infants being more vulnerable to the disease. Most not if all present signs of viral pneumonia, indicated by presence of infected fluid within the lungs. What children and infants don't seem to present is hypercytokinemia (A fatal immune reaction consisting of a positive feedback loop between cytokines and immune cells, with highly elevated levels of various cytokines. Synonymous to the "Cytokine Storm" implicated in the high mortality rates of the Spanish flu outbreak of 1918-1920.) which is purported as a cause of mortality in adults and the elderly [2,3].

Research indicates that Innate immune cells seed the airways during early life and there is good evidence that the lung leukocyte profile does not change significantly after 3 years of age. Thus, it may be theorised that once children have established an immune system by the ages of 3 - 4, there is a manifold reduction of the risk [4].

The reasoning states that a child has a more robust immune innate immune system indicating that they are able to resist the disease much more. This is substantiated by statistical data indicating the IFR (Infant Mortality Rate) to be 25 times less likely compared to those of adults.

Observing as to how a coronavirus works, it is a positive sense single stranded RNA virus and without going much into the specifics of the strain, the genome study has revealed 10 subunits of which researchers are mainly concerned with genes encoding the infectivity factors such as the peplomers(surface glycoprotein) that cause the virus to adhere to cell membranes.

The body's main method of attack in infected cases of viral origin is to trigger apoptosis and phagocytosis. In children this takes place at a higher rate, accuracy and response compared to that of adults [5].

The induction of apoptosis and subsequent phagocytosis of virus infected particles seems to be an innate antiviral mechanism among multicellular organisms. The model of S.A.R.S. Virus to which the current COVID-19 model shows 96% similarities to, indicated in earlier S.A.R.S. studies that the phagocytic pathway is prominent in recovery.

Additionally, once with the help of vaccines, when passive immunisation is achieved within the host organism with anti-covid-19 antibodies, they will provide greater elimination efficiency thus both of these processes working synergistically [6].

In humans it is the innate immune response that acts as a first defence against new infections. This is reduced much more in adults and the elderly with set immune systems. The detrimental aspect of this is that there is no immunological memory left of the defence provided by the cells in the body and thus no benefits of an active or adaptive immunity are conferred to the child. Unless Naive T cells, and B cells are able to adapt, work synergistically and present an immunological response to the infection, adaptive immunity will not be conferred to the patient.

What we do know at this point in time based on early studies is that Placental transmission of the virus has not occurred, based on the understanding that COVID-19 is a respiratory virus which usually do not follow the placental transmission model The current understanding is that it spread by respiratory droplets, contact with infected persons, and aerosolized particles in vicinity present on contact surfaces or in the atmosphere [7].

Previous studies have shown that S.A.R.S. (another significant coronavirus infection) during pregnancy is associated with a high incidence of adverse maternal and neonatal complications. These include:

- Spontaneous miscarriage,
- Preterm delivery,
- Intrauterine growth restriction,
- Application of endotracheal intubation,
- Admission to the intensive care unit,
- Renal failure,
- And disseminated intravascular coagulopathy.

However, pregnant women with COVID-19 infection in the present study had fewer adverse maternal and neonatal complications and outcomes than would be anticipated for those with SARS-CoV-1 infection. Some markers to note is that infection with COVID-19 did not cause pneumonia in the mothers but in some cases lead to premature membrane rupture and foetal distress [8].

Similarly known is that infants and children who are breastfed and are nutritionally balanced are much more capable of resisting most viral infections [9].

An important marker of the COVID-19 viral infection is that of adults with comorbidities being affected much more seriously.

Children are also less likely to have exposure to stress, and adverse environmental factors like pollution, cigarette smoke, which definitely hampers recovery and reduces the natural protective responses of the body.

An important aspect to note is that while the T cells and and B cells are still maturing, there are more cells to spare as the pluripotent cell numbers are much higher in children as well as there being a healthier average telomere length.

Conclusion

While the milder symptoms are a promising aspect in paediatrics there is still the concern that prolonged repeated exposure will be detrimental to any group in the demographic. The case for prolonged exposure to viral origin pathogens conferring adaptive or active immunity is very poor. Thus, while children are showing the strength to resist, we must follow strict healthcare guidelines and care for them in an even stricter sense, so that in a case of COVID-19 infection, the children's own innate immunity will fortify them enough to escape its more serious consequences in the present and foreseeable future till a vaccine can be found.

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