



COVID -19 in children

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COVID-19 basics

- COVID-19= “novel coronavirus” disease
- SARS-CoV-2= the name of the virus that causes COVID-19
- Diseases caused by other coronaviruses
 - mild common cold
 - Severe Acute Respiratory Syndrome (SARS)
 - Middle East Respiratory Syndrome (MERS)
- Corona= something suggesting a crown-projections on the surface of the virus

Origin of SARS-CoV-2

- Believed to be zoonotic
 - First reported from wet market in the central Chinese city of Wuhan
 - Genomic sequence analysis of COVID-19 showed 88% identity with two bat-derived coronaviruses
- more distant from similar coronaviruses in humans
 - SARS-CoV ~79% similarity and
 - Middle East respiratory syndrome coronavirus (MERS-CoV) ~50% similarity

Pathogenesis of COVID-19 infection

- Angiotensin converting enzyme II (ACE2) is known as cell receptor - direct membrane fusion between the virus and plasma membrane, viral genome replication and release
- body's humoral and cellular immunity activation after Ag presentation- IgG and IgM production
- imbalanced and excessive immune responses cytokine storm resulting in severe pneumonia and acute cardiac injury
- Reduced CD4⁺ and CD8⁺ - might result in subsequent secondary bacterial infection.

Pathophysiology of severe disease

- Competent innate immunity, humeral and cell-mediated immunity **prevents the virus from reaching alveoli in large numbers.**
- **If the viruses reach the alveoli** in large number, alveolar lymphocytes , macrophages and airway epithelial cells secrete cytokines, chemokines to eradicate virally infected cells.
- **extensive scale response** leads alveolar and interstitial inflammation, filling alveoli with inflammatory exudates, results in **severe hypoxia and respiratory failure.**

Symptoms of COVID-19

- As many as 80% of infected individuals have mild or no symptoms
- common symptoms include
 - Fever
 - Sore throat
 - dry cough
 - fatigue
 - loss of appetite,
 - loss of smell and body ache.

Severe symptoms

- often indicates pneumonia and associated ARDS
 - high fever
 - severe cough and
 - shortness of breath
- severe cases are due to severe inflammation rather than a direct damaging effect of the virus itself

Rare symptoms

- may occur with or without respiratory symptoms

Neurological symptoms

- loss of smell
- inability to taste
- muscle weakness
- tingling or numbness in the hands and feet
- dizziness
- confusion
- delirium
- seizures, and stroke.

Rare symptoms cont....

Gastrointestinal symptoms

- loss of appetite
- Nausea
- Vomiting
- diarrhoea, and abdominal pain or discomfort

Epidemiology of COVID-19 in children

- children have so far accounted for 1%-5% all diagnosed cases
- often have milder disease than adults
- deaths have been extremely rare.
- vertical intrauterine transmission of COVID-19-unknown

Diagnostic findings

- have been similar to adults.
 - nucleic acid detection- RT-qPCR- sensitivity of 50%–79%
 - ELISA- sensitivity to be studied
- Elevated inflammatory markers were less common in children
- Lymphocytopenia- reported rarely

Are children protected from COVID -19?

- No age is free of risk of infection, rare fatal infections have been reported.
- possible reasons for the current low rate of COVID-19 in children
 - children have fewer outdoor activities, less international travel
- The number of pediatric patients may increase in the future
- The low rate at the beginning of a pandemic does not necessarily mean that children are less susceptible to the infection.

Favourable reasons for low rate of COVID-19 in children

- A difference in the distribution, maturation, and functioning of viral receptors like ACE-2
- healthier respiratory tracts less exposure to cigarette smoke and air pollution
- Less strong immune response (cell mediated) due to lack of memory cells specific to other circulating coronaviruses
- Children might have better antibodies due to frequent reparatory infections.

Suggested treatment

- No drug is proven to be effective yet
- Supportive care includes:
 - providing oxygen
 - Inhalations
 - nutritional support and
 - maintaining fluids and electrolyte balances.
 - use of broad-spectrum antibiotics to cover secondary bacterial infection

Approaches on trial

- Broad spectrum antivirals
 - Combination of lopinavir, ritonavir and ganciclovir
- Virally targeted inhibitors - Remdesivir
- Chloroquine and azithromycin
- Antibody and plasma therapy
- Vaccine for prevention

Peculiarities of Pediatric COVID-19

- Children aged <1 year - the highest percentage (up to 62%) of hospitalization in children
- Pediatric patients might not have fever or cough.
 - CDC report: 56% of pediatric patients had fever, 54% reported cough
- Myalgia, sore throat, headache, and diarrhea are less common in children

TABLE. Signs and symptoms among 291 pediatric (age <18 years) and 10,944 adult (age 18–64 years) patients* with laboratory-confirmed COVID-19 — United States, February 12–April 2, 2020

Sign/Symptom	No. (%) with sign/symptom	
	Pediatric	Adult
Fever, cough, or shortness of breath [†]	213 (73)	10,167 (93)
Fever [§]	163 (56)	7,794 (71)
Cough	158 (54)	8,775 (80)
Shortness of breath	39 (13)	4,674 (43)
Myalgia	66 (23)	6,713 (61)
Runny nose [¶]	21 (7.2)	757 (6.9)
Sore throat	71 (24)	3,795 (35)
Headache	81 (28)	6,335 (58)
Nausea/Vomiting	31 (11)	1,746 (16)
Abdominal pain [¶]	17 (5.8)	1,329 (12)
Diarrhea	37 (13)	3,353 (31)

COVID, CDC, et al. "Coronavirus Disease 2019 in Children—United States, February 12–April 2, 2020." *Morbidity and Mortality Weekly Report* 69.14 (2020): 422.

Why children might contribute more in the transmission

- Asymptomatic children play an important role in disease transmission, they may not be identified as infected without symptoms
- Quarantine might not be practical.
- Infants and young children might shed the virus in the stool for several weeks after infection.

Caring for Children at the time of a pandemic

- Practicing and showing preventive measures
 - Cleaning hands often. Use of soap and water, or an alcohol-based hand rub.
 - Maintain a safe distance (6 feet) from anyone who is coughing or sneezing.
 - Not touching eyes, nose or mouth.
 - Covering nose and mouth with bent elbow or a tissue when coughing or sneezing.
 - Disposing used diapers properly, and washing hands after changing diapers
- Helping children to stay active- needed for physical and mental health
 - Encouraging to play outdoors
 - Indoor activities
- Parents should stay calm and shall reassure children.
- It is important to talk to children about what is happening in a way that they can understand

Impact on children beyond the direct effect

- Vaccination and primary care services will be compromised, leading to increased mortality from preventable causes
- Increased rate malnutrition
- Missed schooling
- increase rates of child labour related to parental financial insecurities
- Increased rate of domestic violence- associated with stress
- Sexual exploitation, teenage pregnancy, and child marriage.
- Some may end up orphaned

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“While there’s life, there’s hope.”

Marcus TS

Thank you!