

SARS-COV 2 / COVID-19 INFECTION IN CHILDREN

Learning objectives

Transmission and pathogenesis and background

Why do children react differently to covid-19

Clinical presentation and complications

Lab Examinations ,Treatment and prevention

Background

A single strand enveloped RNA virus belong to the family coronaviridae ,its name derived from latin crown

Coronaviruses are a large family of viruses and can cause the common cold in humans Rarely, new strains of coronavirus can jump from animals to humans to (cause disease, other examples: SARS (2003) and MERS (2012)

COVID-19 is the name of the “novel coronavirus” disease

SARS-CoV-2 is the name of the virus that causes COVID-19

Emerged from Hubei Province, China in December 2019

Burden of the disease

Pediatric cases of coronavirus disease 2019 (COVID-19), caused by severe acute .respiratory syndrome coronavirus 2 (SARS-CoV-2), have been reported

there are relatively fewer cases of COVID-19 among children compared to adult patients , In the United States, 15 - 20% ,In China, 2.2% ,In Italy 1.2% of confirmed cases of COVID-19 were among persons aged <18 years ,the cases percentage by .age

Less than 1month – 7 percent

1 month to 1 year – 22 percent

1 to 2 years – 10 percent

2 to 5 years – 11 percent

◦5 to 10 years – 16 percent

10-18 years – 34 percent

◊About 50% of cases are infants, 43 % are asymptomatic

..And only 7% had severe infections

Transmission and pathogenesis

Through droplets from coughing and sneezing of sick human

.Through droplets of sick human on surface

◊Most cases in children result from household exposure

.Incubation Period : 2-10 days

.The virus attach to ACE-2 receptors on the membrane of alveoli type 2 cells

The disease progress from asymptomatic period---URTI---pneumonia---SARS

COVID 19 and fetal infection

A neonate delivered to a mother with covid 19 have elevated antibody levels and - abnormal cytokinase test 2 hours after birth , the elevated IgM antibody level suggested that the neonate was infected with the virus in utero

Mixed evidence on the vertical transmission of virus from the mother to fetus-

Among 100 women with SARS-CoV-2 infection who delivered 101 infants, only two infants had equivocal reverse transcription polymerase chain reaction (RT-PCR) results that may have reflected SARS-CoV-2 infection

Covid 19 and breast feeding

CDC -Research has not shown that COVID 19 positive or suspected mother transmit the virus through breastmilk ,but the mother should takes all precaution of wearing mask and washing hands while breastfeeding

Why do children react differently to covid-19

: multiple hypotheses exist

1-Children have a qualitatively different response to the virus than adult

2-The common simultaneous presence of other viruses in the mucosa of the lungs , which could limit the growth of SARS-CoV2 by direct virus to virus .interactions and competition

3- Less expression levels of the (ACE)-2 receptor in children

Clinical features

common signs and symptoms of COVID-19 in children are

fever , cough, shortness of breath , Sore throat

nausea/vomiting ,diarrhea ,abdominal pain

Fatigue , headache ,loss of taste and smell

Signs and symptoms overlap significantly with those of other viral infections, .including influenza and other respiratory and viral infections

asymptomatic infection was reported in up to 43% of children

multisystem inflammatory syndrome in children [MIS-CI

Atypical presentation in children

acute illness leading to multi-organs failure and shock (myocardial dysfunction ,coagulopathy ,gastrointestinal problem

Post-COVID 19 conditions (long –term effects)

-tiredness or fatigue ,headache ,trouble sleeping trouble concentrating , muscles and joint pain and cough

Laboratory tests

- RT-PCR SARS-CoV2 test
- Standard COVID-19 IgM/IgG

- normal or decreased total WBC count and decreased lymphocyte count
- Increased of liver enzymes (AST, ALT)
- Increased LDH , C-reactive protein (CRP) , D-dimer value is increased
- Chest CT scan.
- Potential markers of severe disease: elevated inflammatory markers (eg, CRP, procalcitonin, interleukin 6, ferritin, D-dimer .

Outpatient COVID 19 testing criteria

An immune-compromising condition (eg, on chemotherapy, solid organ transplant recipients, primary immunodeficiency

Chronic cardiac and pulmonary disease

clinical manifestations of multisystem inflammatory syndrome in children .

Diabetes mellitus and neuromuscular diseases

for hospitalized patients scheduled for procedures (eg, endoscopy

.The diagnosis is made by a positive PCR test, which is highly specific

HRCT scan has a higher sensitivity but lower specificity and can play a role in the .diagnosis and treatment of the disease

RT-PCR may produce initial false negative results, so patients with typical CT .findings but negative PCR should be repeated to avoid misdiagnosis

Treatment

children with mild or moderate disease can managed with supportive care alone

1-Respiratory support: Oxygen when Po₂ less than 94%, CPAP, Mechanical ventilation, ECMO ,IV fluid

2- Treatment of MIS-C I (steroid, anticoagulant, IVG

3- Antiviral drugs(Remdesivir, lopinavir, Oseltamivir

4-Dexamethazone (for hospitalized children who need high-flow oxygen, noninvasive ventilation, invasive mechanical ventilation, or extracorporeal membrane oxygenation

5- Convalescent plasma ,Interleukin 6 inhibitors

- **Remdesivir is recommended for**

:1- hospitalized children aged ≥ 12 years with COVID-19 who have risk factors for severe disease and increasing need for supplemental oxygen ,risk factors are

•An immune-compromising condition (eg, on chemotherapy, immunodeficiency

--Chronic cardiac disease (eg, Chronic pulmonary disease

- Poorly controlled type I diabetes mellitus, Neuromuscular disease

2-. hospitalized children aged ≥ 16 years who need for supplemental oxygen

3- hospitalized children of all ages that need for supplemental oxygen in consultation with a pediatric infectious disease specialist .

Prevention

Avoid crowds as possible , Stay away from sick people about 6 feet

(Hand washing for 20 seconds , Cough and sneeze with care(elbow)

Keep things clean

Vaccination as (Pfizer –BioNTech COVID 19 vaccine)

-common side effects of the vaccine are headache ,muscle pain ,chill and fever nausea and decrease appetite and swollen lymph node

-pfizer –BioNtech vaccine have been used for children age 5- 11 years with lower dose (10 micrograms) than that of adult and children above 11 years that is (30 .microgram) .