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Original Article

The Presentation, Risk Factors and Prognosis of COVID 19 Infection in Children in Child Central Teaching Hospital in Baghdad 2020-2021

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Abstract:

Introduction:

Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has been observed to affect a smaller proportion of children compared to adults on a global scale. As compared to adult population, the incidence of VOID19 is lower in pediatric population. Additionally, most pediatric cases presented with mild disease

Patient and Method: *This was prospective study include all children below age 14 years admitted to the infectious disease ward in Childs Central teaching hospital from march 2020 to march 2021.the study enrolled 200 patients we divided the patients according to their age, sex, comorbid disease, presenting symptoms and prognosis, we follow the patients for two months after discharge.*

Result: *From march 2020 to march 2021, 218 patients admitted to infectious ward in central children teaching hospital in Baghdad 200 patients were enrolled in this study. More than half patients were male (51%). Most patients (45%) =90 aged 6-14 years. Most patients (35%) =70 was previously healthy and the most comorbid disease was malignancy (27.5%) =55. The most presenting symptom was fever (40%) =80. Most patients were moderate illness (80%) =160 need only antipyretic, intravenous fluid and sometimes antibiotics. Only 4 patients need ventilator. All patients recovered completely except two patients died.*

Conclusion and Recommendation: *Most cases of covid 19 infection in children are mild compared with adult and very few numbers of patients need hospital admission. Because it is new disease and because the disease course and severity differ from that occur in adult, we recommended more and wide studies about covid 19 infection in children regarding incidence, clinical features, diagnosis, treatment and prognosis in pediatric age group.*

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1. INTRODUCTION

In 2019, the condition known as Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has been observed to affect fewer children compared to adults on a global scale. According to the available data from the Centers for Disease Control and Prevention (CDC), children accounted for 17.2% of the total reported cases of COVID-19 as of January 11, 2023 (1). The majority of pediatric cases observed exhibit minor symptoms, and the recommended approach is providing supportive care. The etiology of the disease can be attributed to the novel Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV2). The virus is characterized by its enclosed structure, single-stranded RNA genome, and positive-sense polarity. Similar to other viruses of the Coronaviridae family, transmission of this virus occurs through direct touch or respiratory droplets. Infections resulting from viral agents belonging to the Coronaviridae family primarily impact the respiratory and gastrointestinal systems, leading to a range of symptoms that span from mild common cold or pneumonia to severe conditions such as acute respiratory distress syndrome (ARDS), multi-organ failure, or fatality (2). However, it should be noted that SARS-CoV2 has the greatest level of transmissibility when compared to other CoV viruses, with an estimated basic reproduction number of 2.5 (1.8–3.6) (3). According to the American Academy of Pediatrics (AAP), children constitute 18.1% of the total reported cases in 49 states, based on age. Recent data have shown that almost 15.2 million children in the United States have tested positive for COVID-19 since the beginning of the pandemic. This figure denotes a cumulative incidence of 20,247 cases per 100,000 children (4). Cough and fever are often observed signs of COVID-19 in pediatric patients. Although, these symptoms may not consistently manifest and may not align with the typical symptoms observed in adult individuals. Consequently, it is crucial to maintain a heightened level of suspicion for SARS-CoV-2 infection in pediatric patients (5-7).

There has been a lower incidence of COVID-19 diagnoses in children compared to adults, with the majority of pediatric patients exhibiting moderate symptoms. The initial scarcity and reduced intensity of cases in children, in comparison to adults, was hypothesized to be attributed to several factors. Firstly, children generally have lower levels of exposure, particularly those who are primarily cared for at home. Additionally, children commonly encounter a greater number of respiratory tract infections during the winter season, which may result in higher levels of antibodies against the virus compared to adults (8). The available data indicate that the primary mode of transmission among children is through household members who have tested positive for SARS-CoV-2 (9). Hence, the prompt and appropriate isolation of adults who have been exposed to epidemiological risks within their family can effectively safeguard children from contracting infections (10). In a general sense, children have a lower propensity for transmitting SARS-CoV-2 when compared to adults. Additionally, children demonstrate a decreased susceptibility to SARS-CoV-2, which is characterized

by an extended incubation period and a longer duration of viral excretion in the stool (11,12,13).The reduction in outdoor activities and international travel among children may lead to a corresponding decrease in virus infection rates (14).

The available data also indicate a lower likelihood of SARS-CoV-2 infection among children under the age of 5 compared to older children. However, the underlying cause for this observation remains unclear (15). Children typically exhibit a heightened vulnerability to the SARS-CoV-2 pathogen. Nevertheless, the degree of disease severity subsequent to infection is comparatively lower in the pediatric population than adults. The majority of COVID-19 infections in the pediatric population are characterized by mild symptoms or are asymptomatic. Common manifestations include fever, cough, diarrhea, and other mild symptoms. In contrast to adults, the occurrence of severe respiratory distress requiring oxygen supplementation or assisted ventilation is infrequent among children. Additionally, the utilization of chest CT scans and antiviral medications is uncommon in this age group (13). According to a study conducted in China, it has been observed that children represented only 2% of the total reported cases of COVID-19 infection (16). Children who have pre-existing conditions, such as type 1 diabetes, congenital cardiac and circulatory abnormalities, obesity, essential hypertension, epilepsy, neuropsychiatric disorders, asthma, malnutrition, and Down syndrome, are more susceptible to experiencing severe episodes of illness (17, 18, 19). Moreover, children who have complicated chronic diseases have a much higher likelihood of experiencing severe disease compared to children who do not have chronic diseases. Children who have impaired immune systems experience a 2.89-fold higher likelihood of acquiring the SARS-CoV-2 virus (20-22). Conversely, with increasing child's age, the impact of a previous malnutrition history on children with severe COVID-19 reduced minimally, with the largest vulnerability observed among younger children (below the age of 5) (18).

According to the official reports of the Iraq's Ministry of Health, a significant number of cases have been documented among the pediatric population subsequent to the identification of the variation in Iraq . The frequency of polymerase chain reaction (PCR) testing conducted in children is notably lower in comparison to adults due to a combination of factors including the fact that a considerable proportion of infected children, exhibit either no symptoms or very minor manifestations. Consequently, the necessity for PCR testing may not be readily apparent in these cases. Additionally, a significant number of families may choose to decline PCR testing for their children, further contributing to the lower overall rate of testing in this population. The incidence of diagnosed cases among children under the age of 10 had a notable surge, rising from 11,699 cases as of 11 March to 13,546 cases on 24 March. This is a substantial increase of 15.7% over a span of two weeks (23,24).

2. PATIENTS AND METHODS

This was prospective study include all children below age 14 years admitted to the infectious disease ward in Childs Central teaching hospital from march 2020 to march 2021. The total number of patients were 218 patients we exclude 18 patients from study, exclusion criteria include patients who left the hospital and patients who didn't do PCR for COVID 19. We divided the patients according to their age from 0 to one year, from 1 to 5 years and 6 to 14 years.

Also, we divided the patients according to their presenting symptoms (the main symptom makes the family consult doctor and cause hospital admission) because many patients have many symptoms like fever associated with cough, vomiting or other symptoms. We divided the patients according to medical condition mild to moderate, no need for oxygen, sever need oxygen, and critical need assisted ventilator. We also divided the patients according to the comorbid disease or if they are previously healthy or not. Finally, we show the outcome for all patients. All patients were positive result of PCR for COVID 19. The medical history taken from parents for all patients and from many patients who were old enough, physical examination done for all patient, chest x-ray done for all patients. We monitor the patients daily in the ward and we follow up the patients for 2 months after discharge from the hospital.

3. RESULTS

From march 2020 to march 2021, 218 patients admitted to infectious ward in central children teaching hospital in Baghdad 200 patients were enrolled in this study. More than half patients were male (51%). Most patients (45%) =90 aged 6-14 years. Most patients (35%) =70 was previously healthy and the most comorbid disease was malignancy (27.5%) =55 referred to our ward from oncology and hematological ward. The most presenting symptom was fever (40%) =80. Most patients were moderate illness (80%) =160 need only antipyretic, intravenous fluid and sometimes antibiotics. Only 4 patients need ventilator. All patients recovered completely except two patients died one of them was a case of complex congenital heart disease and the other was a case of Ewing sarcoma stage four and they died due to their disease not due to COVID 19. there is difference between age groups most patients 6 years and above most of them refer from another ward in the hospital. There slight difference between male and female (**Table 1**). The most presenting symptom was fever, the fever not respond to oral and rectal antipyretics with or without antibiotics. the

least presenting symptom were skin rash and chest pain (**Table 2**). The most patients admitted to infectious word were previously healthy where as the most comorbid disease was malignant disease all of them refer to our ward from oncology and hematology unit (**Table 3**). Most patients were mild to moderate severity even patients with severe comorbid disease, as shown in the (**Table 4**). only 4 patients need mechanical ventilator. Nearly all patients recover completely except 2 patients died and they are died due to their medical condition (one of them complex congenital heart disease and the other was Ewing sarcoma stage 4).

Table 1. Age and gender distribution of the studied group

Variable		No.	%
Age	< One year	50	25.0
	1 – 5 years	60	30.0
	≥ 6 year s	90	45.0
Gender	Male	102	51.0
	Female	98	49.0

Table 2. Presenting symptoms of patients in infectious ward

Presenting symptom	No.	%
Fever	80	40.0
cough	40	20.0
Abdominal pain	30	15.0
Diarrhea	20	10.0
vomiting	20	10.0
Shortness of breath	7	3.5
Skin rash	2	1.0
Chest pain	1	0.5
Total	200	100.0

Table 3. Medical conditions and comorbidities of the studied group

Variable	No.	%
Previously healthy	70	35.0
Malignancy	55	27.5
Asthma	30	15.0
Cerebral palsy	15	7.5
Diabetes mellitus	10	5.0
Congenital heart disease	10	5.0
End stage renal disease	5	2.5
Metabolic disorder	5	2.5

Table 4. Severity of disease and the outcomes of the studied group

Variable		No.	%
Degree of severity	Mild to moderate	174	87.0
	Severe	22	11.0
	Critical (need ventilator)	4	2.0
Outcome	Complete recovery	198	99.0
	Death	2	1.0

4. DISCUSSION

During the study period 865 patients were admitted to the infectious ward in child s central teaching hospital 218 of them diagnose as COVID-19 infection 200 patients enrolled in this study and 18 patients excluded because they left hospital or didn't do PCR for COVID 19. We found that most patients were previously healthy (70 patients =35%). The most comorbid disease was malignancy this may be due to presence of oncology unit in our hospital and /or due to immune deficiency because of disease itself or become of chemotherapy used in treatment. Most patients age were 6 to 14 years (90 Patients (45%)). The most presenting symptoms was fever (80 patients = 40%) the fever was not responding to usual measures like antipyretic or antibiotic with or without supplement like zine or vitamin D3 taken by family or described by doctor. most patients become afebrile after complete 48 hours in hospital. In a study conducted in China, Wu et al. (25) documented that the predominant

initial symptoms observed among a cohort of 44 symptomatic cases were cough (32.43%) and fever in (27.03%). Additionally, authors underscored a considerable proportion of younger children who are infected with SARS-CoV-2 did not show symptoms. The observed discrepancy could potentially be attributed to variations in sample size and the fact that our study exclusively included hospitalized patients. It has been established that gastrointestinal signs frequently coexsit with the initial presentation of fever. Frequently observed symptoms encompass stomach discomfort, diarrhea, and/or emesis. There have also been documented neurologic symptoms (26-28).

Yusuf et al. in 2019 (29) identified obesity and diabetes as two significant risk factors. The study revealed that obesity was the most prominent risk factor associated with hospitalization resulting from COVID-19. The prevalence of obesity and morbid obesity demonstrates a positive correlation with advancing age. The association between obesity and risk of developing health complications shown a positive correlation, indicating that individuals with morbid obesity faced a two to three-fold increased risk compared to those without this level of obesity (29). Howevr, in our studied group, none of the cases were obese which can explain the discrepancy in findings between our study and the other studies. Furthermore, it is noteworthy that the majority of patients included in our study were sourced from a distinct specialized ward. The occurrence of cutaneous manifestations, like rashes, has been seen in individuals diagnosed with COVID-19 (30). In Italy, a female child of 8 years of age has been verified to have contracted the SARS-CoV-2 virus, exhibited an asymptomatic papulovesicular exanthem and a moderate cough. The patient's symptoms spontaneously resolved within a week without the need for therapeutic intervention (31). In out study, most patients in the hospital had mild to moderate illness, very few patients need oxygen and only 4 patients need mechanical ventilators. Nearly all patients, 99%, recover completely recover completely, even patients with malignancy like leukemia or lymphoma or others who receive multiple cycles of chemotherapy. Only 2 patients died one of them had Ewing sarcoma female her age 12 years and she was in severe illness even before she gets COVID 19 infection and the other was male age 35 days with hypoplastic left heart syndrome with ventricular and atrial septal defect who was severely ill since birth. All patients need assisted ventilator referred to our ward from oncology unit ,all of them were tired before covid 19 infection (acute myeloid leukemia one

case, lymphoma one case , neuroblastoma one case and Ewing sarcoma when case) , so the main cause of sever covid 19 in children were malignancy .

5. CONCLUSION

Most cases of COVID-19 infection in children are mild compared with adult and very few numbers of patients need hospital admission. The prognosis very good and most patient need simple measure and the sever disease occur mostly in patients had comorbid disease, even patient with serious illness recover completely. Because it is new disease and because the disease course and severity differ from that occur in adult, we recommended more and wide studies about COVID-19 infection in children regarding incidence, clinical features, diagnosis, treatment and prognosis in pediatric age group.

Ethical Issues: All ethical issues were approved by the authors from the Iraqi Ministry of Health. Verbal and signed informed consents were obtained from all patients who included in the study during their first visit.

Conflict of interest: None

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