Research Article

The Different Clinical Characteristics of COVID-19 Patients Between Pediatric and Adults

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Abstract

Background: In December 2019, a novel coronavirus (a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)) emerged in Wuhan, China.
Objectives: The current research aimed to evaluate the clinical features of COVID-19 infection in pediatric patients and compare them with those of adult patients in Sanandaj, Iran.
Methods: Retrospectively, 56 hospitalized cases, including 32 adult and 24 pediatric patients with COVID-19 from March 7th, 2020, to June 5th, 2020, were enrolled in this study. The clinical and laboratory findings of the pediatric patients with COVID-19 infection were analyzed and compared with those of the adult patients.
Results: The average number of fever days in adults was higher than that of pediatric patients (P = 0.04). Cough was more severe in adults than in pediatric patients (P = 0.03). Diarrhea was not statistically different between the two groups. Dizziness was far more common in adults than pediatric patients (P = 0.01). The percentage of blood oxygen saturation decreased in both groups, but there was no statistically significant difference between the two groups. C-reactive protein (CRP) was positive in many patients in both groups; however, there was no difference between the pediatric and adult patients. Lymphopenia was significantly higher in adults than in pediatric patients (P = 0.02). As in pediatric patients, an increase in liver enzymes was seen in adults. However, there was no statistically significant difference between the two groups.
Conclusions: The present study showed that pediatric patients with COVID-19 infection have milder clinical symptoms than adults. However, according to the laboratory findings, pediatric patients need to be followed up as well as adult patients.

Keywords: COVID-19, Adults, Pediatric Patients, Clinical Features

1. Background

In December 2019, a novel coronavirus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in Wuhan, China. The disease caused by this virus has been given the name 'corona virus disease 2019' (COVID-19) by the World Health Organization (WHO) (1). Corona virus disease 2019 spread rapidly worldwide, and the WHO announced it as a pandemic on March 11th, 2020 (2). The infection was not seen in children early on, and it was thought that children would not be infected with SARS-CoV-2 (3). Soon afterward, there were reports of COVID-19 infections in children (4-8). The prevalence of COVID-19 in children has been reported to be much lower than in adults (4). This may be because of their lower nosocomial exposure. However, some studies have suggested that children, like adults, develop COVID-19 infection (5), which can cause respiratory, liver, digestive and nervous system disorders (9, 10). Unfortunately, the epidemiological and clinical patterns of COVID-19 have mainly remained unknown, especially among children (6). However, some reports state that pediatric symptoms of COVID-19 infection are mild, and the prognosis is better than in adults (11, 12).

2. Objectives

The current study analyzed and compared the clinical features in children and adults with COVID-19 infection in Sanandaj, Iran. The aim of the current research was to provide a better understanding of the differences in the clinical characteristics of COVID-19 infection in pediatric and adult patients and to help with the timely diagnosis and treatment of this disease in pediatric patients.

3. Methods

3.1. Ethics

This research was approved by the Ethics Committee of Kurdistan University of Medical Sciences, Sanandaj, Iran (IR.MUK.REC.1399.055).

3.2. Patients

In the current study, a total of 24 under 14-year-old patients diagnosed with COVID-19 infection from March 7th, 2020, to June 5th, 2020, were selected from Besat Hospital, Kurdistan University of Medical Sciences, Sanandaj, Iran. Furthermore, 32 adults with COVID-19 infection, including 26 males and eight females, were randomly selected from those referred to Tohid Hospital, the center for adult patient treatment with COVID-19 at Kurdistan University of Medical Sciences, Sanandaj, Iran.

3.3. Collecting the Information

The information recorded included demographic data, exposure history, symptoms, signs, and laboratory findings.

3.4. Corona Virus Disease 2019 Diagnosis

Infection was diagnosed in the patients based on the guidelines for the diagnosis and treatment plan of SARS-CoV-2 (National Health Committee) (Abnormal chest CT-scan or PCR test positive) (13). The criteria for diagnosing COVID-19 infection in pediatric patients were formulated based on those of adult patients.

3.5. Laboratory Confirmation

Clinical and laboratory information was obtained from the registered medical files. A team of physicians reviewed all data before being processed for analysis.

3.6. Statistical Analysis

Data were analyzed with SPSS software. The continuous variables were reported as mean ± standard deviation (SD), and the categorical variables were reported as frequency and percent. Mean differences for continuous data between two studied groups, pediatric and adult patients, were analyzed using the independent sample *t*-test or its corresponding non-parametric test (Manne Whitney). Chi-square or Fisher's exact test was used to compare the frequency distribution of categorical data between two groups. A P-value of less than 0.05 was considered statistically significant.

4. Results

4.1. Demographic Characteristics

The participants in this study included twenty-four pediatric patients with confirmed COVID-19 infection. The ranging age of the patients was from 10 months to 14 years, and fourteen of the patients were female. In this study, it was found that four patients were in contact with people with COVID-19 (Table 1). In addition, the clinical findings of 32 adults with COVID-19 infection, including 26 males and eight females with a mean age of 51.93 ± 10.70 years, were compared with those of the pediatric patients (Table 1).

Table 1. Demographic Characteristics of Pediatric Patients Infected with Severe Acute Respiratory Syndrome Coronavirus 2 [a]

Variables	Pediatric	Adults
Age	7.29 ± 4.46	51.93 ± 10.70
Gender		
Male	10 (41.66)	26 (81.25)
Female	14 (58.33)	8 (18.75)

[a] Values are expressed as mean ± SD or No. (%).

4.2. Clinical Features

Most pediatric patients had a mild fever with a maximum temperature of less than 40°C. Fever resolved in all patients within 1 to 7 days. About 15 pediatric patients had a cough. Six pediatric patients had diarrhea. The mean oxygen saturation in pediatric patients was 90.45%. Three pediatric patients developed skin lesions. Three of the pediatric patients developed body bruises. No dizziness was observed in any of the patients (Table 2). The biochemical parameters in pediatric patients infected with SARS-CoV-2 are shown in Table 2. The mean white blood cell count was normal in pediatric patients. Although the mean lymphocyte count was normal in the pediatric patients, 16 had lymphopenia.

The mean hemoglobin of the pediatric patients was normal. However, in 8 pediatric patients, the hemoglobin level was lower than normal; in 1 case, the hemoglobin level was higher than normal. High levels of C-reactive protein (CRP) were observed in most pediatric patients. Liver enzymes (ALP, aspartate aminotransferase (AST), and alanine aminotransferase (ALT)) were elevated in most pediatric patients. The creatinine (Cr) and blood urea nitrogen (BUN) levels were normal in pediatric patients (Table 2).

The clinical features of the adult patients are shown in Table 2. Although the maximum body temperature in the adults was lower than that of the pediatric patients, the average number of fever days was significantly higher in the adults than in the pediatric patients (P = 0.04). Cough was more common and more severe in adults than in pediatric patients (P = 0.03). Gastrointestinal manifestations such as diarrhea were not statistically significant between the two groups. Dizziness was far more common in adults than pediatric patients (P = 0.01). The percentage of blood oxygen saturation decreased in both groups; however, there was no significant difference between the two groups. C-reactive protein was positive in a large number of patients in both groups, but there was no difference between the pediatric patients and the adults. Lymphopenia was significantly higher in adults than in pediatric patients (P = 0.02). As in pediatric patients, an increase in liver enzymes was seen in the adults; however, there was no significant difference between the two groups. There was no difference in the Cr and BUN levels of the two groups (Table 2).

5. Discussion

Previous studies have reported cough, fever, shortness of breath, muscle pain, tiredness, and headache as the main clinical characteristics of COVID-19 (14, 15). Laboratory findings have shown that decreased lymphocyte counts, increased liver enzymes, and bilateral pneumonia are the common clinical signs of COVID-19 infection (16). However, the probable differences in the clinical features of this infection in pediatric and adult patients are still not well understood. In the present study, a retrospective analysis of the clinical features in pediatric patients with COVID-19 infection compared with that of adult patients showed that the clinical symptoms (including fever and cough) were milder in pediatric patients. This is because the immune system responds less in pediatric patients than in adult patients.

Fever is a common symptom in patients with COVID-19; however, it is less severe in pediatric patients than in adults. Thus, the number of fever days was more among adults than among pediatric patients. Cough was more severe in adults than in pediatric patients. A study by Du et al. found that dry cough and fever were the most common clinical signs of COVID-19 in pediatric patients and were less severe than in adults (12). This is because a lower inflammatory response to lung injuries causes milder clinical symptoms in pediatric patients than in adults (12). In this study, there was no difference in the prevalence of diarrhea between pediatric patients and adults. Moreover, other studies have reported no significant difference in the incidence of diarrhea between pediatric and adult patients with COVID-19 (12). In this study, no dizziness was observed in any of the pediatric patients; however, a large number of adults complained of dizziness. In another study, the rate of dizziness was higher in adults than in pediatric patients (12). Dizziness is one of the symptoms of COVID-19 in adults (17, 18). C-reactive protein levels were elevated in adult and pediatric patients, suggesting that SARS-CoV-2 caused inflammation. It has been reported that the number of lymphocytes decreases in patients with COVID-19, which is associated with the severity of the disease (19). People who die from COVID-19 have been found to have extremely low lymphocyte counts (20). The current study showed that lymphopenia is more common in adult patients with COVID-19 infection than in pediatric patients. In a study by Du et al., it was reported that although lymphopenia occurs in adult and pediatric patients, it is more common in adults (12). The COVID-19 infection is more severe in adults than in pediatric patients, which may be because lymphopenia is more common in adults. In the present study, liver enzymes increased in adults and pediatric patients; however, no significant difference was observed between the two groups. Liver enzyme levels have been shown to increase in patients with COVID-19 infection, which can have devastating effects, especially in people with liver problems (21). The Cr and BUN levels in pediatric patients and adults were normal.

This study was performed on pediatric patients with COVID-19 infection, and the clinical findings were evaluated. The results showed that pediatric patients with COVID-19 have milder clinical symptoms than adults. However, according to the laboratory findings, pediatric patients must be followed up as adults and use preventive protocols.

Acknowledgments

Table 2. Comparison of Clinical Findings of Pediatric with Severe Acute Respiratory Syndrome Coronavirus 2 with Adults [a]

Clinical Findings	Children (n = 24)	Adults (n = 32)	P-Value [b]
Fever			
Febrile days	2.79 ± 2.02	5.13 ± 2.53	P = 0.04 [c]
Maximum temperature °C (Oral)	38.40 ± 0.69 (36.6 - 37.2)	37.02 ± 1.18 (36.5 - 37.5)	P = 0.67 [c]
O₂ saturation	90.45 ± 2.62	88.91 ± 3.03	P = 0.75 [c]
Cough	15 (62.5)	27 (84.37)	P = 0.03 [d]
Diarrhea	6 (25)	9 (28.1)	P = 0.98 [d]
Dizziness	0 (0)	18 (50)	P = 0.01 [e]
Skin lesions	3 (12.5)	- [f]	
Body bruising	3 (12.5)	- [f]	
CRP (positive)	20 (83.33) (9 - 11 (less than 2 y)) (8.8 - 10.8 (2 - 12 y))	26 (81.25) (less than 10 mg/L)	P = 0.65 [e]
WBC	8.34 ± 4.69 (5 - 15 billion cells/L (2 - 6 y)) (4.5 - 13 billion cells/L (6 - 12 y))	7.11 ± 3.37 (3.4 - 9.6 billion cells/L)	P = 0.83 [g]
Lymphopenia	16 (66.66) [h]	27 (85.00) [h]	P = 0.02 [d]
ALP	22.50 ± 22.30 [i]	23.66 ± 18.76 (20 and 147 U/L)	P = 0.76 [g]
ALT	73.20 ± 90.39 (< 41 U/L)	75.56 ± 40.33 (< 35 U/L)	P = 0.65 [g]
AST	59.00 ± 73.18 (< 41 U/L)	62.29 ± 30.42 (5 - 40 units/L)	P = 0.74 [g]
sCr	0.87 ± 1.13 (0.5 to 1.0 mg/dL)	1.14 ± 0.21 (0.6 - 1.2 mg/dL)	P = 0.82 [c]
BUN	2.79 ± 1.17 (1.8 - 6.4 mmol/L)	1.96 ± 2.03 (1.8 to 7.1 mmol/L)	P = 0.65 [c]
HB	11.02 ± 1.49 [j]	13.3 ± 3.1 (8.0 - 17.0 g/dL)	P = 0.65 [c]
MCV	85.23 ± 1.55 (child: 80 - 95 fL, newborn: 96 - 108 fL)	78.6 ± 4.2 (80.0 - 110.0 fL)	P = 0.65 [g]
MCH	28.18 ± 1.42 (pediatric: 27 - 31 pg, newborn: 32 - 34 pg)	26.2 ± 2.1 (26.0 - 38.0 pg)	P = 0.60 [c]
HCHC	33.63 ± 3.59 (child: 32 - 36 g/dL, newborn: 32 - 33 g/dL)	33.4 ± 2.31 (31.0 - 37.0 g/dL)	P = 0.62 [c]
PLT	219.33 ± 11.57 (250 to 450 × 10⁹/L)	221 ± 23.11 (50 to 400 × 10⁹/L)	P = 0.85 [g]
ESR	41.41 ± 40.64 (0 - 10 mm/h)	55.32 ± 32.55 (men: 0 - 50 mm/h, women: 0 - 30 mm/h)	P = 0.80 [g]

Abbreviations: WBC, white blood cell; HB, hemoglobin; MCV, mean corpuscular volume; MCH, mean corpuscular hemoglobin; PLT, platelet count test; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; ALT, alanine aminotransferase; AST, aspartate aminotransferase; sCr, serum creatinine; BUN, blood urea nitrogen; y, years old; m, month olds.

[a] Values are expressed as mean ± SD or No. (%).

[b] A P-value less than 0.05 is statistically significant.

[c] Independent samples *t*-test

[d] Chi square test

[e] Fisher's exact test

[f] It has not been measured.

[g] Mann Whitney Test

[h] The normal lymphocyte counts in children < 2 years, the normal count is 3000 to 9500/mcL (3 to 9.5 × 10⁹/L). At the age of six years, the lower limit of normal is 1500/mcL (1.5 × 10⁹/L).

[i] Males 0 - 14 days: 83 - 248 U/L, 15 days - < 1 year: 122 - 469 U/L, 1 - < 10 years: 142 - 335 U/L, 10 - < 13 years: 129 - 417 U/L, 13 - < 15 years: 116 - 468 U/L, 15 - < 17 years: 82 - 331 U/L, 17 - < 19 years: 55 - 149 U/L, ≥ 19 years: 40 - 129 U/L. Females, 0 - 14 days: 83 - 248 U/L, 15 days - < 1 year: 122 - 469 U/L, 1 - < 10 years: 142 - 335 U/L, 10 - < 13 years: 129 - 417 U/L, 13 - < 15 years: 57 - 254 U/L, 15 - < 17 years: 50 - 117 U/L, ≥ 17 years: 35 - 104 U/L.

[j] Less than 9 (2 - 6 m), less than 10 (6 m - 2 y), less than 11 (2 - 12 y), less than 12 (girl more than 12), less than 13 (boy more than 12)

Footnotes

during submission or after publication.

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