

Clinical Spectrum of COVID-19 in a Pediatric Mexican Population

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Short Report

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Abstract

Objective

From the beginning of the COVID-19 pandemic, it has become evident that the spectrum of manifestations in children is different from those seen in adults. In this study, we aimed to describe a broader clinical spectrum of COVID-19 in children.

Methods

In this descriptive, prospective study, we included confirmed pediatric patients with COVID-19 who presented to the emergency department of a pediatric tertiary care center from April to July 2020. All patients were confirmed by the SARS-CoV-2 RT-PCR test, and we analyzed 24 symptoms and 25 signs.

Results

We analyzed 50 patients with COVID-19. From the evaluated signs and symptoms, the most common symptoms were fever, excessive crying and dry cough, digestive symptoms were frequently found (24%), and the most common signs were pharyngeal erythema and irritability.

Conclusion

Clinicians should recognize that the clinical spectrum of COVID-19 in children is wider than previously described, often with nonspecific signs and symptoms, and digestive symptoms should raise suspicion.

Research Brief

What this study adds?

The clinical spectrum of COVID-19 in children is wider than previously described. Often the signs and symptoms are nonspecific, digestive symptoms and other symptoms like loss of taste or sensation should raise suspicion. Some patterns of appearance of symptoms and comorbidities like obesity could predict poor outcomes.

Introduction

The incidence of COVID-19 in Mexico began to escalate rapidly since April 2020. By July 31, Mexico had the third highest number of deaths by COVID-19 worldwide. By August 7, 12,052 cases of COVID-19 in children were confirmed in Mexico, with 188 deaths [1].

From the beginning of the COVID-19 pandemic, it has become evident that the spectrum of manifestations in children is different from those seen in adults. However, most of the clinical descriptions have been made from retrospective studies addressing a narrow number of manifestations. A meta-analysis [2] and a systematic review [3] evaluated less than ten signs and symptoms. The aim of this study was to describe a broader clinical spectrum of COVID-19 in children.

Methods

We conducted a prospective study in the emergency department of a pediatric tertiary care center from April to July 2020. We included patients <18 years of age, of any sex, with a history in the week before inclusion of at least one of the following criteria: a) one respiratory symptom, b) one gastrointestinal symptom or c) fever and recent exposure to a confirmed COVID-19 case. Patients with tracheostomy, severe neurologic underlying conditions, use of sedatives in the last week or children not accompanied by the primary caretaker were excluded. All cases were tested with SARS-CoV-2 reverse-transcriptase-polymerase-chain-reaction nasopharyngeal swabs. For the patients who met the inclusion criteria, we looked for 24 symptoms presented prior to evaluation at the emergency department and 25 signs at the physical exploration, and the information was gathered by attending physicians. Gastrointestinal symptoms were defined as the presence of diarrhea, vomiting, nausea or abdominal pain. We analyzed the data from the COVID-19 confirmed patients; the information was analyzed using case counting and descriptive statistics, calculating medians, ranges, quartiles and percentages.

To describe the chronology of the appearance of symptoms, we performed diagrams for each patient. A horizontal line represents the time (days) before admission. Time zero represents the day of onset of the first symptom. The time of appearance of each symptom was placed over the line.

We defined pneumonia as the presence of one of the following: a) increased work of breathing and B) oximetry <93%.

Results

A total of 92 children were evaluated. Fifty children (54%) were diagnosed with COVID-19 infection by a positive SARS-CoV-2 RT-PCR test. Since chronic patients may have different clinical manifestations, they were described separately from previously healthy patients. (Tables 1 and 2).

Twenty-six patients with confirmed COVID-19 infection had a previous chronic medical condition. The most common underlying condition was cancer (16% of the patients), followed by chronic lung disease (12%), obesity (8%), chronic kidney disease (6%) and neurological disorders (4%). Three patients had more than one chronic condition.

From the evaluated symptoms, 35 children presented fever (70%), 36% excessive crying and dry cough, and we found hyposmia in 4% of the patients. We found that digestive symptoms were common, 24% of

the patients presented only gastrointestinal symptoms. All patients without any respiratory or gastrointestinal symptoms were immunocompromised.

From the evaluated signs, 30 children presented pharyngeal erythema (60%), 24 with irritability (24%) and 10 rhinorrhea and conjunctival hyperemia (20%).

The first symptom to appear was fever in 36% of the cases and cough in 12%, followed by fatigue, rhinitis, and excessive crying in 8% of the patients. Manifestations intentionally sought but not found in any patient were expectoration, mucopurulent rhinorrhea, posterior nasal discharge, mucopurulent conjunctival discharge, and epistaxis. Manifestations intentionally sought that were found in only one patient were nasal mucosa oedema, rhonchi, cyanosis, lymphadenopathy, grunting, and wheezing.

Analyzing the diagrams of the symptom appearance chronology, we defined three different patterns:

Pattern "A" or almost asymptomatic: with only one or two symptoms.

Pattern "S" or sudden: onset of four or more symptoms in the first 24 to 36 hours.

Pattern "D" or disperse: sequential onset of symptoms over several days.

The patterns were distributed in an irregular form in both groups; nonetheless, considering only the patients with pneumonia, the "S" pattern was found in seven of nine of the chronically ill patients, in two of eight immunocompromised patients, in four of the five patients with chronic lung disease and in three of four obese patients.

The rate of admission was significantly higher in chronically ill (61.5%) versus healthy individuals (31.7%); however, seven of the twenty-six chronically ill individuals were admitted for previous disease decompensation. Of the eight immunocompromised patients, two developed pneumonia. Four of the five patients with obesity also developed pneumonia

All patients with pneumonia except one were admitted. Only one patient developed Kawasaki-like syndrome. Two patients required mechanical ventilation: one of them was a patient with cystic fibrosis and the other was a kidney transplant patient who died.

Discussion

The clinical suspicion of SARS-CoV-2 infection in children has been a challenge for physicians around the world. A lot of case series have been published, however, most of them are retrospective and collected few clinical features. This study aimed to describe a broader clinical description of SARS-CoV-2 infection in children, exploring intentionally a lot of signs and symptoms in a heterogenous population of pediatric patients.

A broader description of the disease is of paramount importance for the clinical suspicion of SARS-CoV-2 infection in children. This is particularly important in low-income countries with limited access to the test.

In these circumstances the decision to perform a SARS-CoV-2 RT-PCR test relies on the clinical suspicion.

Although our study included a limited number of patients, it explored a wider clinical spectrum in a heterogeneous population of pediatric patients.

The testing capacity for SARS-CoV-2 in Mexico is limited and reserved for patients who meet the national epidemiological definition. Many children with symptoms consistent with COVID-19 in the community are not tested and consequently not diagnosed. Our inclusion criteria allowed us to analyze patients who otherwise would not have been tested. These results may serve to reconsider epidemiological definitions for children with suspected COVID-19.

It is important to highlight that this study captured data from children who were seen or managed within a tertiary health-care institution; one-half of the patients had a chronic medical condition. Consequently, the study population is likely to primarily represent individuals with the more severe end of the disease spectrum. Statistical differences between the two groups were not calculated since the research was designed as case series description, the sample is small and there is wide difference in age between both groups.

Adult patients with digestive symptoms without respiratory symptoms are rare [4], while in children, it seems to be more frequent. Our results suggest the SARS-CoV-2 infection often presents with nonspecific signs and symptoms, and digestive symptoms even in the absence of respiratory symptoms should raise suspicion.

Loss of taste and smell in adults has been reported in up to half of patients [5] and proposed as an important discriminatory symptom. Chemosensory dysfunction in children is seldom reported [6], but our results suggest that both hyposmia and dysgeusia are not so rare.

Pneumonia in patients with COVID-19 has been reported in up to 64.9% of children with COVID-19 using radiologic criteria [7], but it is rarely reported using clinical criteria. We found one-third of patients with pulmonary infection exploring only clinical features.

The recognition of different clinical patterns of COVID-19 may help us recognize patients with a higher risk of poor outcomes. Our results suggest that the “S” or sudden pattern is associated with pneumonia in patients with underlying chronic conditions. Additionally, as shown in young adults [8], obesity appears to be an important risk factor for poor outcomes (pulmonary involvement) in children with COVID-19.

Clinicians should recognize that the clinical spectrum of COVID-19 in children is wider than previously described and different from the adult presentation; often with non-specific signs and symptoms, digestive symptoms should increase clinical awareness. The order of appearance of symptoms (clinical pattern) requires more investigations, as our results suggest that it could predict outcomes.

Declarations

Authors' Contributions: EB conceptualized the study design. EB, DC, NS, MC recruited patients and collected demographic and clinical data. EB and DC analyzed and interpreted the results. EB wrote the manuscript in Spanish, NS, DC translate the manuscript. DC, NS, MC EB commented on and revised the manuscript. All authors approved the final report.

This work should be attributed to: Emergency Department, Hospital Infantil de México Federico Gomez

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Authors declare no conflicts of interest.

Status of ethical clearance: The study was approved by the ethics committee.

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Tables

Table 1. Signs and Symptoms among 50 Pediatric Patients with confirmed COVID-19

SYMPTOMS	Number (%)	SIGNS	Number (%)
Time of onset of symptom*	72 (33-144)		
Fever	35 (70)	Pharyngeal erythema	30 (60)
Excessive crying	18 (36)	Irritability	12 (24)
Dry Cough	18 (36)	Rhinorrhea	10 (20)
Rhinitis	13 (26)	Conjunctival hyperemia	10 (20)
Sore throat	12 (24)	Respiratory distress	6 (12)
Headache	11 (22)	Dehydration	6 (12)
Abdominal pain	11 (22)	Crackles	4 (8)
Conjunctival hyperemia	11 (22)	Fever	4 (8)
Vomiting	11 (22)	Rash	3 (6)
Diarrhea	11 (22)	Diminished breath sounds	3 (6)
Shortness of breath	10 (20)	Rhonchi	2 (4)
Fatigue	9 (18)	Nasal mucosa oedema	2 (4)
Hyporexia	9 (18)	Dysphonic	2 (4)
Myalgia	7 (14)	Hyperemia of pillars	2 (4)
Dysgeusia	4 (8)	Somnolence	2 (4)
Arthralgia	4 (8)		
Productive cough	4 (8)	KIND OF SYMPTOMS	
Rash	4 (8)	Only respiratory	25 (50)
Hoarseness	5 (5)	Only gastrointestinal	12 (24)
Excessive daytime sleepiness	3 (6)	Both	10 (20)
Hyposmia	2 (4)	Without any of them	3 (6)
Cyanosis	2 (4)		

**Median (IQR)time from admission to onset of first symptom, hours

Table 2. Demographic Characteristics, Outcome Previous Treatment, and Clinical Patterns among 50 pediatric patients with confirmed COVID-19

	Chronic medical illness (N=26)	Previously healthy (N=24)	Total (N=50)
Age months, median	108	18	56.6
(IQR)	(26-153)	(7.25-99.5)	(13-159)
Sex male, n (%)	20 (76.9)	15 (62.5)	35 (70)
Immunosuppression*, n (%)	8 (30.8)	0 (0)	8 (16)
Pneumonia*, n (%)	8 (30.8)	10 (41.7)	18 (36)
Admitted, n (%)	16 (61.5)	9 (37.5)	25 (50)
Previous Antibiotic treatment, n (%)	7 (26.9)	4 (16.7)	15 (30)
Previous Symptomatic treatment, n (%)	19 (73.1)	16 (66.7)	35 (70)
CLINICAL PATTERNS			
Pattern "A" (almost asymptomatic), n (%)	4 (15.4)	7 (29.1)	11 (22)
Pattern "B" (sudden), n (%)	12 (50)	9 (37.6)	21 (42)
Pattern "D" (disperse), n (%)	8 (30.8)	10 (38.8)	18 (36)

Supplementary Files

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