

CLINICAL MANIFESTATIONS AND DIAGNOSIS OF COVID-19 IN PEDIATRIC PATIENTS: A RETROSPECTIVE STUDY

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ABSTRACT

This retrospective study explores the clinical manifestations and diagnosis of COVID-19 in pediatric patients, focusing on the presentation of mild symptoms. The study was conducted at a tertiary care center and included a cohort of 200 pediatric patients diagnosed with COVID-19. Analysis of the data revealed distinct age distribution patterns, with the highest proportion of cases observed in the 0-1 age group, followed by patients aged 1-2 years. The most prevalent symptoms at the onset of the disease included mild manifestations such as fever, upper respiratory symptomatology, and digestive symptoms. Additionally, a smaller subset of patients exhibited neurological symptoms, lower respiratory symptoms, and renal manifestations in the form of oliguria. Diagnostic methods employed encompassed RT-PCR and Rapid Antigen tests, with notable differences in their effectiveness. Notably, patients presenting with fever experienced a longer duration of hospitalization compared to those without fever. These findings contribute to our understanding of the clinical characteristics of mild COVID-19 cases in pediatric patients and emphasize the importance of early diagnosis and appropriate management strategies.

Keywords: Covid-19, infections, antigen, pediatric

Introduction

The emergence and rapid global dissemination of the SARS-CoV-2 virus have posed a significant public health challenge, warranting immediate attention from international health authorities (1). This article provides a comprehensive review of the impact of SARS-CoV-2 on pediatric populations, focusing on global and regional perspectives. By examining epidemiological data and clinical observations, this study aims to enhance our understanding of the virus's effects on children, including newborns and infants, in different regions worldwide. Additionally, it explores the

distribution of confirmed cases among various age groups in Asia, America, Europe, and specifically in Romania, shedding light on the relatively low percentage of pediatric infections and the exceptionally rare occurrence of fatalities in this population (2). The findings presented herein contribute to the ongoing discourse surrounding SARS-CoV-2, facilitating evidence-based decision-making for the protection and management of pediatric health (3).

In order to establish a diagnosis of COVID-19, testing for the identification of SARS-CoV-2 infection is necessary. The National Institute of Public Health, as of April 28, 2020, recommends testing for suspected

cases according to the case definition for acute respiratory syndrome with the novel coronavirus (COVID-19) (4). The case definition takes into account two aspects: the epidemiological context and symptomatology. The epidemiological context includes well-defined criteria related to travel history, contact with suspected or confirmed individuals, and involvement in social clusters. The second aspect, clinical manifestations, focuses on individuals of all ages presenting with the clinical triad of fever, cough, and difficulty breathing (5). Suspected cases meeting the case definition for acute respiratory syndrome with the novel coronavirus are tested using the real-time polymerase chain reaction (RT-PCR) method for nucleic acid amplification. A positive RT-PCR test result confirms the case as a confirmed case, regardless of the presence or absence of clinical signs and symptoms (6).

It should be noted that pediatric patients often present with respiratory symptoms such as fever, cough, and respiratory distress, which resemble the clinical picture observed in adults (7). A significant proportion of children may also exhibit nonspecific digestive manifestations, neurological symptoms, rashes, and cutaneous lesions at the onset (8). Understanding these atypical presentations helps clinicians establish a correlation between nonspecific disease onset (beyond the suspected case definition) and SARS-CoV-2 infection.

Materials and methods

This article presents a retrospective clinical study conducted over a two-year period at the Pediatrics Department of “Sf. Apostol Andrei” County Emergency Clinical Hospital in Constanta. The study aims to evaluate the clinical symptomatology and diagnostic methods used in pediatric patients diagnosed with COVID-19. A cohort of 200 patients who met specific inclusion criteria, such as positive rapid antigen or RT-PCR tests and exhibiting respiratory or digestive symptoms after contact with a confirmed SARS-CoV-2 infected individual, was included in the study.

By retrospectively analyzing the collected data, this study aims to provide valuable insights into the clinical symptomatology of COVID-19

in pediatric patients, as well as evaluate the effectiveness of the diagnostic methods employed. The findings of this study may contribute to a better understanding of the disease's presentation in this specific population and inform future research, clinical decision-making, and the development of diagnostic strategies tailored to pediatric COVID-19 cases.

Results and discussions

This study focuses on the clinical manifestations and diagnostic methods used in pediatric patients with COVID-19. By analyzing a cohort of 200 patients, the study provides insights into the timing and nature of symptoms, as well as the effectiveness of testing approaches. The findings contribute to our understanding of pediatric COVID-19, informing healthcare professionals and guiding future research in managing the disease in children.

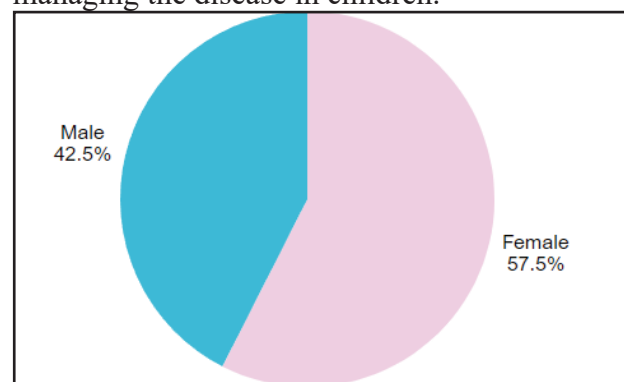


Figure 1. Case distribution by age

Based on the analysis of 200 patients, it was found that the cohort consisted of 115 male patients and 85 female patients (figure 1). The chi-square test was conducted to determine if there was a significant association between gender and patient count. The chi-square statistic was calculated to be 0 with 1 degree of freedom. The resulting p-value indicated no statistically significant association between gender and patient count ($p > 0.05$). Therefore, based on the available data, there is no evidence to suggest a gender difference in the patient distribution (9).

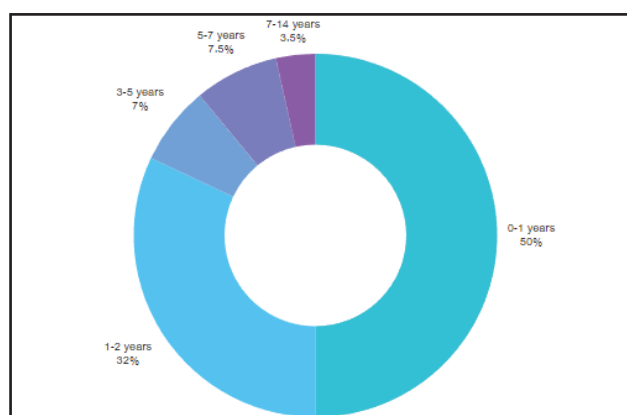


Figure 2 Distribution by age

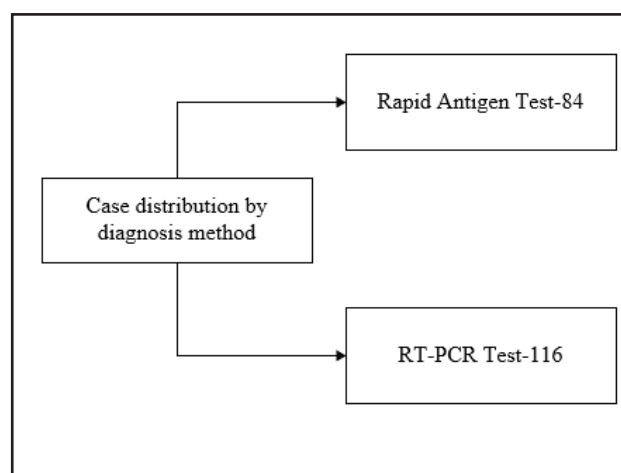


Figure 4 Diagnosis method distribution

Table 1 Case distribution by age

Case distribution by age	
Age group	Number of cases
0-1 years	100
1-2 years	64
3-5 years	14
5-7 years	15
7-14 years	7

The largest proportion of cases was observed in the 0-1 age group, comprising 50% (n=100) of the total patients. This was followed by 32% (n=64) of patients aged between 1-2 years, 7% (n=14) of children aged 3-4 years, 7.5% (n=15) of patients aged 5-7 years, and 3.5% (n=7) of patients falling in the 7-14 years old age group (Figure 2).

These findings suggest that young children, particularly those in their first year of life, may be more susceptible to COVID-19 infection (10).

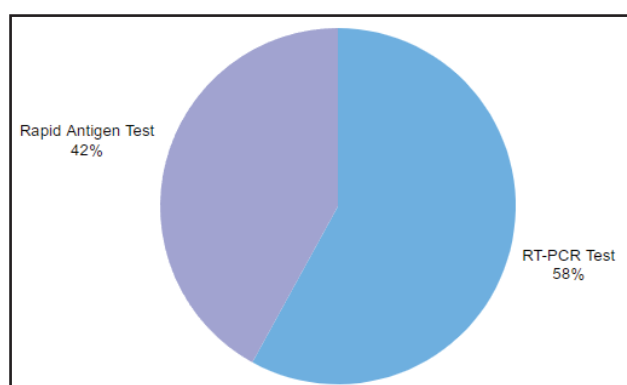


Figure 3 Diagnosis method

The diagnostic methods employed in the study revealed that the majority of patients, specifically 116 individuals, were diagnosed using the RT-PCR test. In contrast, 84 patients were diagnosed using Rapid Antigen tests (figures 3, 4). It is noteworthy that all 116 patients who underwent the RT-PCR tested negative when subjected to the rapid antigen test. The findings suggest that the RT-PCR test and Rapid Antigen test yielded different results, indicating a discrepancy in their diagnostic accuracy for detecting SARS-CoV-2 infection among pediatric patients (11). These results have important implications for clinical decision-making and patient management (12). The higher sensitivity of the RT-PCR test in identifying positive cases emphasizes its reliability as a gold standard diagnostic tool (13). However, the rapid antigen test, despite its lower sensitivity, may still provide valuable information in certain contexts, such as timely screening and initial assessment of suspected cases (14).

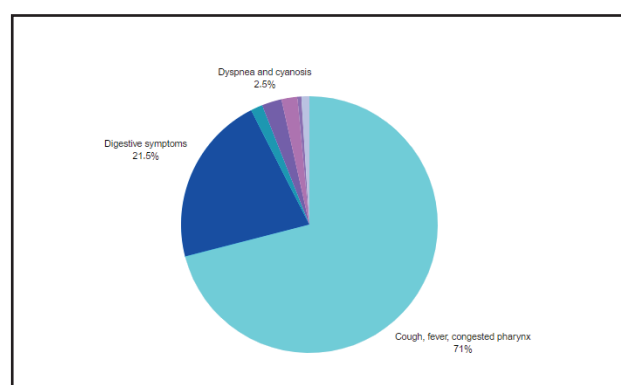


Figure 5 Distribution of Clinical Symptoms in Pediatric Patients

Table II Distribution of Clinical Symptoms in Pediatric Patients

Symptoms on onset	
Cough, fever, congested pharynx	142
Digestive symptoms	43
Neurological symptoms: convulsions	3
Dyspnea and cyanosis	5
Erythema	4
Oliguria	1

The statistical analysis of the dataset revealed that the most prevalent manifestation of COVID-19 among pediatric patients was moderate symptomatology, accounting for 71.5% of the cases. Digestive symptoms were the second most common, comprising 21.5% of the cases (Figure 5). Convulsions, severe respiratory symptoms, dermatological symptoms, and oliguria were observed in 1.5%, 2.5%, 2%, and 0.5% of the cases, respectively. The predominance of moderate symptoms is consistent with previous studies indicating a generally milder disease course in children compared to adults (15). Nevertheless, the occurrence of more severe symptoms and convulsive episodes emphasizes the importance of vigilant monitoring and appropriate medical intervention in managing pediatric cases.

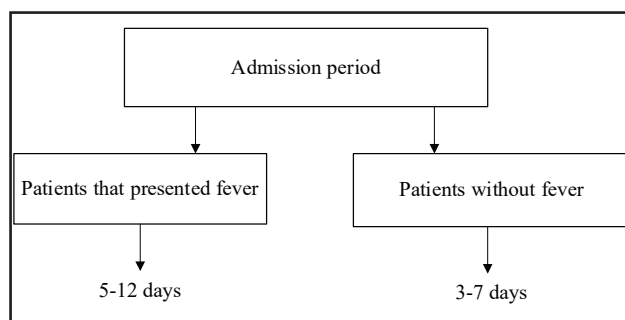


Figure 6 Association between Fever and Length of Hospital Admission in Pediatric COVID-19 Cases

Patients presenting with fever exhibited a significantly longer average admission period of 5 to 12 days, compared to 3 to 7 days for patients without this symptom ($p < 0.05$) (figure 6).

The presence of fever may be indicative of a more severe disease course or complications requiring extended hospitalization in pediatric COVID-19 cases (16).

Conclusions

This retrospective clinical study focused on pediatric patients diagnosed with COVID-19 yields several noteworthy conclusions:

An intriguing age distribution pattern emerges, with the highest proportion of cases found in infants aged 0-1 years, followed by children aged 1-2 years. This highlights the vulnerability of younger children to this viral infection.

In terms of clinical symptomatology, moderate symptoms such as fever, cough, and congested pharynx dominate the presentation. Digestive symptoms and convulsive episodes, though less frequent, also occur. Severe manifestations such as dyspnea and cyanosis are rare.

The study demonstrates the primary reliance on the RT-PCR test, known for its superior sensitivity and accuracy, in diagnosing COVID-19 in pediatric patients. Notably, all patients who tested negative on the Rapid Antigen test had previously tested positive on the RT-PCR test, highlighting the limitations of the former.

Furthermore, an association is observed between fever and the duration of hospital admission. Patients presenting with fever required a longer average admission period compared to those without fever, suggesting a more protracted disease course in these cases.

In summary, these findings enhance our understanding of COVID-19 in pediatric populations, emphasizing the importance of vigilant monitoring, appropriate management, and the utilization of reliable diagnostic approaches. Further research is warranted to refine diagnostic strategies and enhance patient care for this vulnerable cohort.

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