

CLINICAL AND EVOLUTIONARY FEATURES OF SARS-COV-2 INFECTION IN CHILDREN

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ABSTRACT

It has been more than 2 years since COVID-19 pandemic began. Clinical manifestations of SARS-CoV-2 infection in children ranged from asymptomatic to severe. A retrospective, non-randomized study was conducted over a period of one year, between January-December 2022, and included 140 patients diagnosed with SARS-CoV-2 infection at the Pediatric Clinic of the County Clinical Emergency Hospital of Constanta. This study aimed to investigate clinical and evolutionary features of SARS-CoV-2 infection in children who required hospitalization. The results showed a significant number of asymptomatic and mild cases of the disease, but the need for hospitalisation still arises in certain situations. Various clinical manifestations were observed, mainly respiratory, from common cold symptoms to severe manifestations with respiratory distress syndrome, but also gastrointestinal or haematological manifestations (coagulopathies). Children have different risk factors compared to adults for progression to severe form of the disease.

Keywords: SARS-CoV-2 infection, COVID-19, hospitalization, clinical manifestations, evolutionary features, children

Introduction

During the COVID-19 pandemic millions of children have been infected (1). Although children are infected less often than adults, they can transmit the virus even if they are asymptomatic or have mild symptoms (2). However, children with risk factors may present severe clinical manifestations and require hospitalization in intensive care unit (3).

Patients with SARS-CoV-2 infection may have a wide range of clinical manifestations (4). Nonspecific symptoms are related to different systems, mainly the immune, respiratory, gastrointestinal, and neurological (4, 5). The first epidemiological studies have showed that the

main symptoms of the disease are represented by fever, dry cough, dyspnoea, and headache (6). The most frequent complication associated with COVID-19 was Multisystem Inflammatory Syndrome in Children (MIS-C). Laboratory markers of inflammation represent the primary characteristics, which are correlated with the severity of MIS-C (7, 8).

Materials and methods

Retrospective, non-randomized study, carried out for a period of one year, between January-December 2022, which included 140 patients, with the age between 0-16 years, diagnosed with SARS-CoV-2 infection in

the Pediatric Clinic of the County Clinical Emergency Hospital of Constanta.

Results and discussions

From the study carried out on 140 children with SARS-CoV-2 infection examined at the Constanta County Clinical Hospital, it was observed an increased incidence of the disease in infants (49%) and toddlers (28%) (Figure 1).

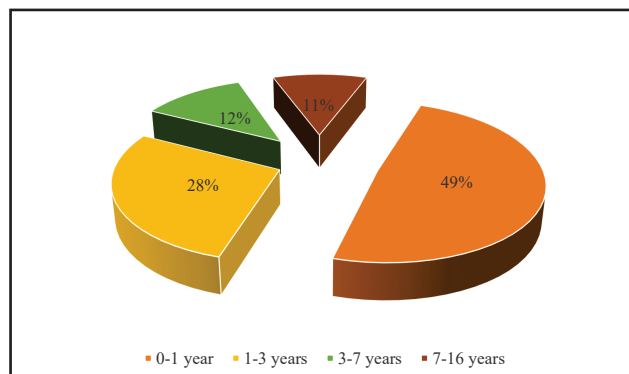


Figure 1. Distribution of cases according to age

Real-Time PCR test (RT-PCR) and rapid antigen test (rapid Ag test) for SARS-CoV-2 were used as diagnostic methods for COVID-19. Out of 140 patients who presented positive result for at least one of the tests, 72 cases were positive for RT-PCR test and 68 cases had positive result of rapid antigen test (Figure 2). It was observed that 19% cases with a negative result for rapid Ag test subsequently had a positive result of the RT-PCR test (Figure 3). It can thus be inferred that the diagnostic method of RT-PCR testing for the detection of SARS-CoV-2 infection is more accurate.

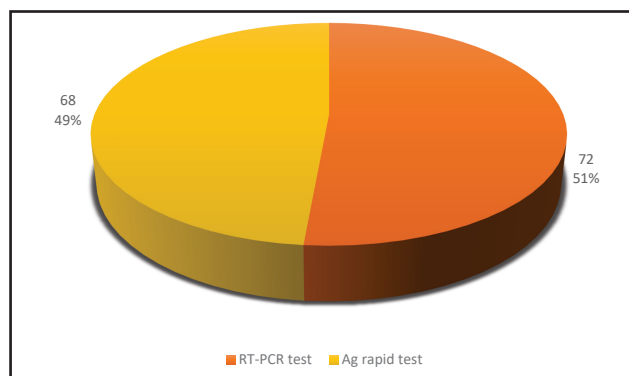


Figure 2: Distribution of cases according to diagnostic method

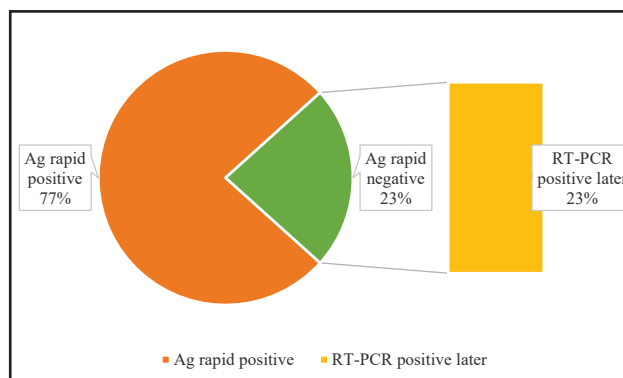


Figure 3: Distribution of cases according to rapid Ag testing

In the studied group, the first onset symptom was represented by fever (38%). Other clinical manifestations include cough (23%), vomiting (15%), diarrhoea (13%) and respiratory failure (11%) (Figure 4). It was observed an association of symptoms: fever and cough, cough and diarrhoea, diarrhoea and vomiting, fever and vomiting, followed by fever, cough and respiratory failure (Figure 5).

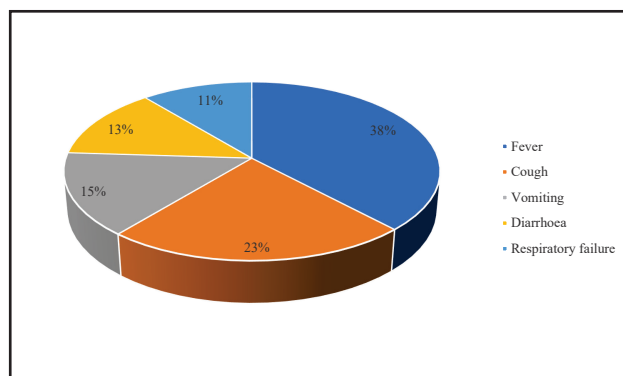


Figure 4: Distribution of patients by onset clinical manifestations

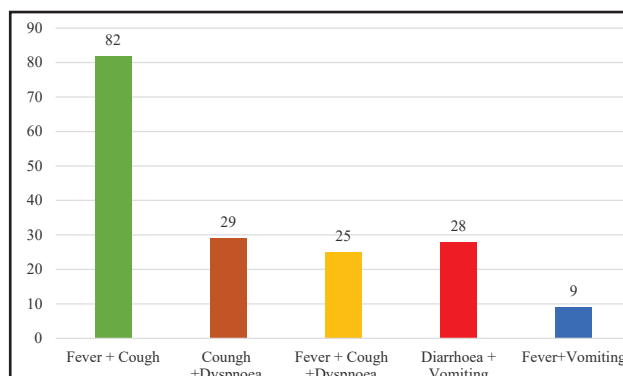


Figure 5: Distribution of cases by association of symptoms

In the studied group it was observed that most cases did not present personal medical history with previous hospitalizations (Figure 6).

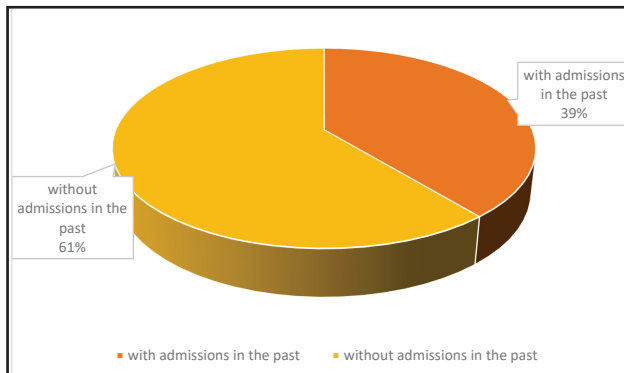


Figure 6: Distribution of cases by personal medical history

The diagnoses of patients who have presented admissions in their personal pathological history are related to respiratory pathologies (bronchiolitis, acute pneumonia, rhinopharyngitis, tonsillitis) in 43% cases, digestive diseases (enterocolitis, dyspepsia) in 23% cases, infectious diseases (rubella, measles, chickenpox) in 24% cases and 1% cases with neurological pathology (febrile seizures).

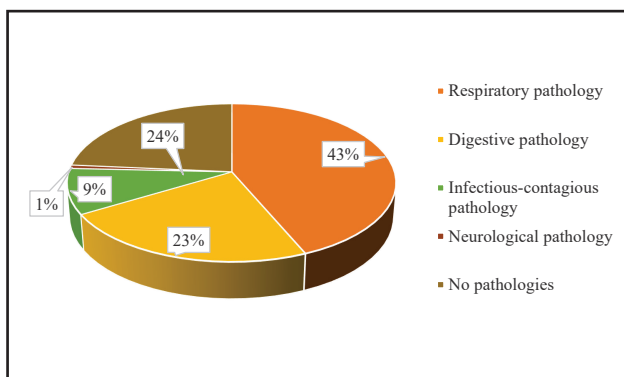


Figure 7: Distribution of cases according to personal pathological history

Comorbidities were represented by dystrophy, rickets, and iron deficiency anemia (Table 1).

Table 1: Case distribution by comorbidities

Dystrophy	Rickets	Iron deficiency anaemia
23	25	57

Often seen clinical manifestations in

children with SARS-CoV-2 infection were represented by respiratory manifestations (103 cases, 73,5%), vomiting and diarrhea (39 cases, 27,8%), followed up by rash (13 cases, 9,2%), febrile seizures (9 cases, 6,4%) and cyanosis (5 cases, 3,5%).

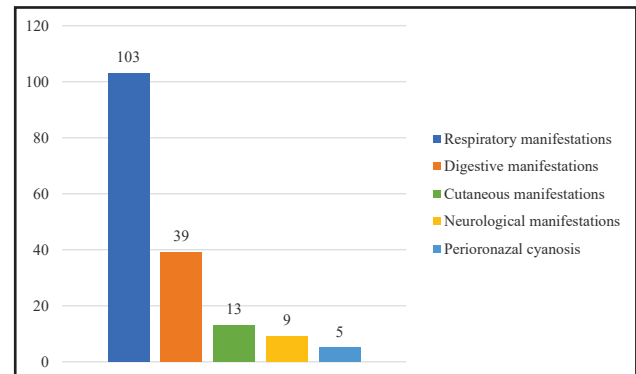


Figure 8: Distribution of cases by clinical manifestations

In the studied group the acute dehydration syndrome occurred through insufficient fluid intake, digestive losses by vomiting and diarrhea, and skin losses by fever (Figure 9).

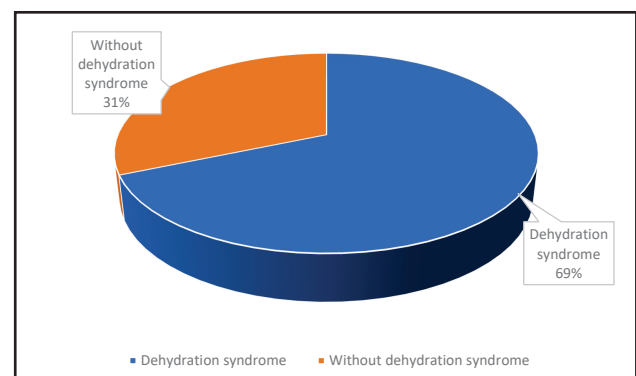


Figure 9: Distribution of cases by occurrence of acute dehydration syndrome

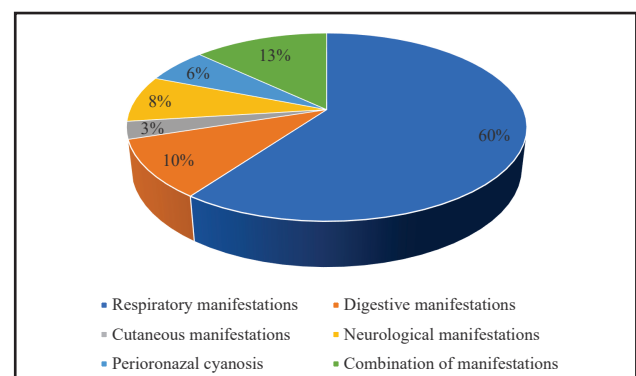


Figure 10: Distribution of cases by clinical manifestations in infants

Infants with SARS-CoV-2 infection represented 68 cases (48%) out of 140, and the most frequent clinical manifestations were respiratory in 41 cases (60%), followed by digestive symptoms in 7 cases (10%), rash in 2 cases (3%), neurological manifestations in 5 cases (8%) and cyanosis in 4 cases (6%).

Most of the cases required hospitalization less than 7 days (125 cases, 89,2%). From this group, 14 cases were discharged on parents' request, although a longer hospitalization would have been necessary.

Table 2 Distribution of cases by hospitalisation

≤7 days	>7 days
125	15

Among the cases which required more than 7 days of hospitalization, age group 0-1 year represented 60% cases, followed up by 1-3 years age group with 27% cases and 3-7 years with 13% cases (Table 3).

Table 3 Distribution by age of cases with more than 7 days of hospitalization

0-1 year	1-3 years	3-7 years	7-16 years
9 cases (60%)	4 cases (27%)	2 cases (13%)	0 cases (0%)

Out of 140 cases with SARS-CoV-2 infection, 97% (135 cases) received treatment with antibiotics. Association of 2 antibiotics were used: Ceftazidime and Gentamicin in 4 cases, Ceftriaxone and Gentamicin in 1 case, Ampicillin and Gentamycin in 2 cases, and in 2 cases the combination of penicillin with aminoglycoside.

In the studied group the majority of patients (47%) received antibiotic treatment with Ampicillin, followed by Ceftazidime (32%), Ceftriaxone (14%) and only 1% required treatment with Meropenem. In one case, Meropenem was used in combination with Remdesivir, a nucleotide class antiviral licensed in July 2020 to treat SARS-CoV-2 infection.

In addition to antibiotic treatment, systemic steroidal anti-inflammatory drugs were used in 98 cases (70%): Dexamethasone in 25 cases (17,8%) and Hydrocortisone hemisuccinate in 73 cases (52,1%). All cases received symptomatic treatment and hydroelectrolytic rebalancing, and 24 cases received adrenaline nebulisations.

Conclusions

From the data analysed in this study, 49% cases are under 1 year old of age. One reason for this cause could be underdeveloped immune system.

According to the personal pathological history, most of the cases had no previous hospitalizations (61%). From this we can conclude that the personal pathological history does not influence SARS-CoV-2 infection, however 75% of the patients associated comorbidities such as dystrophy, rickets, deficiency anaemia which is well known to be the cause of a deficient immune system.

Clinically, the most common symptoms were respiratory in 73% cases, followed up by digestive (27%) and cutaneous manifestations (6%). The high occurrence of manifestations was also present in the most affected age group (0-1 years), with respiratory manifestations (60%), followed by digestive manifestations (10%), cutaneous manifestations (3%), neurological manifestations (8%) and cyanosis (6%).

A significant number of cases needed hydroelectrolytic rebalancing following acute dehydration syndrome caused by lack of fluid intake, digestive losses (vomiting, diarrhoea) and cutaneous losses (fever). Most cases required hospitalisation less than 7 days (89,2%) and only 10% required hospitalisation more than 7 days. It should be noted that the preponderance of those who required medical care lasting more than 7 days (60%) were from 0-1-year age group, followed by 1-3 years and 3-7 years age groups.

Most cases received antibiotic treatment with Ampicillin (47%), followed by Cephalosporins (46%) and only 1% required treatment with Meropenem, associated with systemic steroidal anti-inflammatory drugs in 70% of cases, with favourable evolution.

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