

Clinical Characteristics of COVID-19 among Children in Sarajevo, Bosnia and Herzegovina

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Abstract

Objective – To present the characteristics of children with coronavirus disease 2019 (COVID-19) treated at the Pediatrics Department, Ilidža Primary Health Care, The Public Institution Health Centre of Sarajevo Canton, Bosnia and Herzegovina. **Methods** – This is a descriptive cross-sectional study of 56 children with confirmed SARS-CoV-2 infection between March 2020 – May 2021. The parameters included were: aged 0-6 years, gender, clinical signs and symptoms, type of transmission, the presence of comorbidities, vaccination with Bacillus Calmette – Guérin (BCG) vaccine, laboratory and radiology results, and treatment. **Results** – Out of a total of children 57.1% were aged 3-6 years. There were 58.9% boys and 41.1% girls, 36 children had symptoms and 20 were asymptomatic. The most common symptoms were fever (57.1%) and cough (35.7%). 44 children had a mild form of the disease and they were treated at home with counseling by a pediatrician over the phone, 10 children required outpatient treatment by a pediatrician, 2 were hospitalized. After treatment, all of them recovered. Most of the children (83.9%) were infected by transmission from a household member. **Conclusions** – COVID-19 in children is generally a mild disease. Children with SARS-CoV-2 were mostly infected by contact with an adult, and transmission from children is minimal. Most children were treated symptomatically at home, only a small number were hospitalized.

Key Words: Children ■ Coronavirus Disease (COVID-19) ■ SARS-CoV-2 ■ Primary Health Care.

Introduction

In December 2019 the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified in Wuhan City in China. The high transmission efficiency of SARS-CoV-2 enabled the rapid spread of COVID-19 worldwide (1, 2). The first case of confirmed infection in a child in Bosnia and Herzegovina was at the beginning of March 2020 (3). Children have a lower susceptibility to infection and a milder form of the disease compared to adults (4, 5, 6). The reason for this is their different immune response to the virus, less comorbidity and different ACE2 expression in children (7, 8).

The aims of this study were to present the characteristics of children with COVID-19 in Ilidža

municipality in Sarajevo Canton, Bosnia and Herzegovina (B&H), and to compare data with other published studies.

Methods

Study Design

This descriptive cross-sectional study was conducted at the Pediatrics Department Ilidža Primary Health Center, The Public Institution Health Centre of Sarajevo Canton, B&H, in the period between March 2020-May 2021.

Patients and Procedure

The Pediatrics Department of Ilidža PHC has 4600 medical records of children who live in the Ilidža

municipality and in case of need they are users of public health care. Out of the total number of children, 456 (9.91%) were in quarantine due to SARS-CoV-2 infection or contact with infected persons (data obtained through COVID-19 tracking system in the department). Parents contacted a pediatrician by phone. We used the community supervision system and telemedicine guidance. Not all of the 456 children were tested, but only children with symptoms, children with a chronic disease or comorbidities, and children who went to kindergarten. 56 children had SARS-CoV-2 infection, confirmed by a positive reverse transcription-polymerase chain reaction (RT-PCR) test or positive rapid antigen diagnostic test (RDT) of a specimen, using a nasopharyngeal or oropharyngeal swab. The total sensitivity of RDT strongly depends on the RNA viral copies per milliliter of sample. RDT is a valuable addition to RT-PCR testing, as it reliably detects infectious persons with high viral loads before RT-PCR results are available (9). A special template was created for this research. The medical records of 56 children with confirmed SARS-CoV-2 infection were analyzed. The parameters included were: age (0-6 years), gender, clinical signs and symptoms, type of transmission, the presence of comorbidities, vaccination with BCG vaccine, laboratory and radiology findings, and treatment. The severity of COVID-19 was defined as mild, moderate, severe or critical on the basis of the clinical features, laboratory findings, and chest radiograph imaging, including asymptomatic infection (10). Children with asymptomatic infection had positive test results without any symptoms. Mild infection presented with milder symptoms of the respiratory or gastrointestinal system. Children with moderate infection had clinical and radiological signs of viral bronchitis or pneumonia. Severe infection presented with respiratory distress, tachypnea, hypoxemia. Some had only gastrointestinal symptoms. Children with critical infection may progress to acute respiratory distress syndrome (ARDS), or multiorgan failure, where organ dysfunction can be life-threatening (5, 10).

Ethics Statement

The study was approved by the Ethics Committee of Public Institution Health Centers of Sarajevo Canton, No.: 01-06-7730-3/20.

Statistical Analyses

Standard descriptive statistical methods were used in data analysis. The Chi-square (χ^2) test was used to determine a statistically significant difference. The level of statistical significance was $P < 0.05$.

Results

In the total of 56 children, 32 (57.1%) were aged 3-6 years old, 15 (26.8%) aged 1-3 years, 6 (10.7%) aged 6-12 months, 1 (1.8%) aged 3-6 months, and 2 (3.6 %) aged 0-3 months old. There were 33 (58.9%) boys and 23 (41.1%) girls (Table 1).

Table 1. Characteristics of the 56 Children with COVID-19 Included in the Study

Characteristics of the children	Children (N=56)
	N (%)
Age	
0-3 m	2 (3.6)
3-6 m	1 (1.8)
6-12 m	6 (10.7)
1-3 y	15 (26.8)
3-6 y	32 (57.1)
Gender	
Male	33 (58.9)
Female	23 (41.1)
Symptoms	
Fever	32 (57.1)
37°C - 38°C	22 (68.8)
38°C - 39°C	9 (28.1)
>39°C	1 (3.1)
Lasted 1 - 2 days	22 (68.8)
Lasted 2 - 4 days	8 (25.0)
Lasted > 4 days	2 (6.3)
Cough	20 (35.7)

Characteristics of the children	Children (N=56)
	N (%)
Stuffy nose	10 (17.9)
Fatigue, Weakness	4 (7.1)
Decreased appetite	4 (7.1)
Runny nose	3 (5.4)
Sore throat	2 (3.6)
Diarrhea	2 (3.6)
Vomiting	1 (1.8)
Rash	1 (1.8)
Conjunctivitis	1 (1.8)

Of all the confirmed cases, 36 (64.3%) children had symptoms, and 20 were asymptomatic (35.7%). The most common symptoms were fever

32 (57.1%) and cough 20 (35.7%). The fever was mild, mostly lasting up to two days. There was no significant difference in the clinical manifestations by gender ($\chi^2=0.0035$, $P=0.952$). 44 (78.6%) children had a mild form of the disease and they were treated at home through the community supervising system and tele-medicine guidance. Only 2 children were hospitalized. Ten (17.9%) children had pediatric and outpatient treatment (Table 2).

The children that were treated by a pediatrician had a moderate form of the disease with multiple symptoms (fever lasting for more than 3 days, persistent cough, vomiting, rash, general weakness). Laboratory and chest X-ray (CXR) findings were mostly without deviation. Patient 2 (Table 2) had a macular rash on the lower legs and a slightly reduced number of platelets (PLT $122 \times 10^9/L$),

Table 2. Characteristics of the 10 Children with Outpatient Treatment

Patient	Symptoms	Comorbidities	Transmission	Laboratory findings	Chest X-ray	Treatment
6 – 12 months						
P1; Male	Fever up to 2 days <38°C Diarrhea; Decreased appetite	-	From adult person	Normal	-	Symptomatic treatment
1 – 3 years						
P2; Female	Rash	-	From adult person	PLT $122 \times 10^9/L$ AST 110 U/L ALT 70 U/L	-	Symptomatic treatment
P3; Male	Fever 2-4 days, 38-39°C Cough	-	From adult person	Normal	-	Symptomatic treatment
P4; Female	Fever 2-4 days >39°C Cough; Runny nose; Sore throat; Fatigue; Weakness	-	From adult person	Normal	-	Symptomatic treatment
P5; Male	Fever up to 2 days <38°C Cough; Conjunctivitis	-	From adult person	Normal	-	Symptomatic treatment
P6; Male	Fever up to 2 days <38°C Cough; Runny nose	-	From adult person	Normal	-	Symptomatic treatment
3 – 6 years						
P7; Male	Cough; A stuffy nose Decreased appetite	Chronic bronchitis	From adult person	Normal	Suggestive of bronchitis	Azithromycin; Salbutamol/3 days
P8; Male	Fever 2-4 days 38-39°C	-	From adult person	L $2.5 \times 10^9/L$ Ly $49 \times 10^9/L$ Ne $35 \times 10^9/L$	-	Symptomatic treatment
P9; Male	Fever 2-4 days 38-39°C	-	Unknown	Normal	Normal	Symptomatic treatment
P10; Female	Fever 2-4 days <38°C Cough; Sore throat	Hypothyroidism; Chronic Bronchitis Obesity	From adult person	Normal	-	Symptomatic treatment

which returned to normal after three days of treatment with vitamins. Patient 8 (Table 2) had a fever up to 39°C that lasted five days, with leukopenia (WBC 2.5×10⁹/L), which returned to normal after the fifth day, without special treatment. Two infants, one with fever, diarrhea and vomiting, and the other with prolonged fever and symptoms of bronchiolitis, were hospitalized. Eleven children had comorbidities including: atrial septal defect, chronic bronchitis, vesicoureteral reflux, hypothyroidism, and obesity. In our study, these comorbidities did not affect the severity of the disease. Most children, 47 (83.9%), were infected by a household member. Seven children (12.5%) were infected in kindergarten from another child, while for 2 (3.6%) children the type of transmission was unknown. All the children, except one child, had received the BCG vaccine when they were born, Table 3.

Table 3. Characteristics of 56 Children with COVID-19 Included in the Study

Characteristics of the children	Children (N=56) N (%)
BCG vaccinated at birth	55 (98.2)
Presence of comorbidities	11 (19.6)
Comorbidities	
Cardiovascular	4 (36)
Urogenital	3 (27)
Prematurity	2 (18)
Respiratory	2 (18)
Gastrointestinal	1 (9)
Endocrine	1 (9)
Obesity	1 (9)
Neurological	1 (9)
Atopic constitution	1 (9)
Transmission	
From a sick parent or household member	47 (83.9)
From child- kindergarten	7 (12.5)
Unknown	2 (3.6)

Characteristics of the children	Children (N=56) N (%)
Symptoms	
Symptomatic	36 (64.3)
Asymptomatic	20 (35.7)
Place of treatment	
Home treatment	44 (78.6)
Outpatient treatment	10 (17.9)
Hospital treatment	2 (3.6)
LAB Test performed	12 (21.4)
Chest X ray performed	3 (5.4)

Discussion

Children with COVID-19 have a wide spectrum of clinical manifestations. During the pandemic, children are less represented in relation to the total number of patients and have a milder form of the disease compared to adults (6, 11). The Chinese Center for Disease Control (CDC) revealed that less than 1% of cases occurred in children aged less than 10 years (12). In the United States, children <18 years account for approximately 13%. The incidence increases with increasing age (13, 14, 15). In this study, over 14 months from a total of 4600 children, 56 (1.2%) had COVID-19. The majority of children (35.7%) in our study were asymptomatic, 78.6% children had a mild form of the disease, 3.6% children had a moderate form of the disease (all under 1 year of age). Data from the United States (14) and systematic review and meta-analysis by Irfan et al. (16) showed that hospitalization was most common among pediatric patients aged <1 year and those with a chronic disease. Our study was without lethal outcomes. A systematic review by Viner et al. (17) that included children <20 years of age, documented that the proportion of asymptomatic infections ranged from 15 to 42% (4, 16). We observed slightly more boys than girls. There was no significant difference in the clinical manifestations of the disease by gender (5, 6). In our study, the most common symptoms were fever (57.1%) and cough (35.7%). Other studies also reported

cough and fever as the most common symptoms (4, 16). Gastrointestinal symptoms may occur without respiratory symptoms (18). In our study 1.8% of the children had vomiting and 3.6% diarrhea. Cardiovascular abnormalities (heart failure, arrhythmias, myocarditis, pericarditis, cardiogenic shock, pulmonary embolism) have been reported in smaller case series (19), but in our study we did not have any of these. In our report, skin rash presented in only 1.8% children. Cutaneous manifestations have been rarely reported, and it is not clear whether the cutaneous manifestations were due to SARS-CoV-2 infection itself or were a therapeutic outcome (20). Leukopenia and thrombocytopenia were also reported (21, 22). In our study, leukopenia and thrombocytopenia were reported in 1.8% children.

In our report, 17.9% of the children who had prolonged fever (>3 days) or cough that made breathing difficult, and bad general condition, were examined by a pediatrician on an outpatient basis. The treatment was symptomatic: vitamins, hydration, antipyretics and home isolation for 2 weeks. This is the general clinical management for treatment that was prescribed for patients in the community (10). Only one case, patient 7 (Table 2) with chronic bronchitis was treated with an antibiotic, Azithromycin. Chest imaging is not routinely necessary for diagnosis of COVID-19 in children (23). We performed chest imaging in 5.4% cases; one was normal and two suggestive of bronchitis. Most of the children (83.9%) were infected by transmission from a sick parent or household member. Initial studies indicated that children were asymptomatic carriers, resulting in the closure of kindergartens and schools (24, 25). Recent data suggest that children with SARS-CoV-2 acquire their infection from contact with an adult, with minimal secondary transmission from children (26, 27). In our study, 98.2% children had received the BCG vaccine, according to the protocol after birth. An increasing number of studies have described the nonspecific protective effects against diseases after immunization with an unrelated vaccine or microbial antigen. Published studies suggest that

the population from the regions where BCG vaccination is performed had a milder clinical form of COVID-19 (28, 29).

Despite the fact that children with COVID-19 most often have a mild disease, there are studies presenting unexpected response to the infection (30, 31). Our report included a small number of children from the Sarajevo Canton but covered all cases in the Ilidža municipality, and this data can contribute to an understanding of COVID-19 among children in B&H.

Conclusions

On the basis of the current data, we can conclude that COVID-19 in children is most often a mild disease, with no significant gender difference. Children with SARS-CoV-2 were infected mostly by contact with an adult, and transmission from children is minimal. Most children were treated symptomatically at home. A small number of children were hospitalized.

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Conflicts of Interest: We declare that we have no conflict of interest.

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