

COVID-19 in Children: A Single Center Experience from Istanbul, Turkey

Çocuklarda COVID-19: İstanbul, Türkiye'den Tek Merkez Deneyimi

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ABSTRACT

Objective: We aimed to evaluate the demographic, epidemiological, and clinical characteristics of children with coronavirus disease-2019 (COVID-19), and to determine variations of the clinical presentation of the disease by age.

Method: A total of 104 confirmed COVID-19 patients aged between 0-18 years were retrospectively analyzed. The study period was between March 15, 2020 and July 1, 2020. A confirmed COVID-19 was defined as a child who has positive real-time reverse transcription-polymerase chain reaction (rRT-PCR). The patients were analyzed in terms of demographic, epidemiological, clinical, laboratory and imaging features, and clinical outcomes.

Results: The median age (inter-quartile range) of the patients was 11.8 (8.4) years, and 53 (51%) were male. Ninety-eight (94%) of the patients had an epidemiological risk factor. The most frequent symptoms were cough (62%), fever (42%), and fatigue (33%). Seven patients (7%) were asymptomatic, 84 (81%) were mild, 9 (9%) were moderate, and 4 (4%) were in severe or critical condition. Ninety-eight (94%) of the patients underwent a chest x-ray, and 12% had pneumonia. The patients younger than 5 years were more likely to have fever ($p = 0.019$), rhinorrhea ($p = 0.041$), and diarrhea ($p = 0.035$). Muscle/join pain (26%), loss of smell/taste (20%), and headache (19%) were striking extra-pulmonary symptoms in older patients. Only 8% of the patients were hospitalized, and 4% were admitted to the intensive care unit. No death occurred.

Conclusion: The most of the pediatric COVID-19 cases have mild symptoms without pneumonia. They may not present with fever or cough which are considered characteristic symptoms of the disease and the frequency of signs and symptoms may vary by age. Children younger than 5 years old are more likely to have fever, rhinorrhea, and diarrhea. School-age children and adolescents may present with extra-pulmonary symptoms such as muscle/join pain, smell/taste loss, and headache.

Keywords: COVID-19, SARS-CoV-2, children, clinical characteristics

ÖZ

Amaç: Bu çalışmada, COVID-19 tanısı alan çocukların demografik, epidemiyolojik ve klinik özelliklerini değerlendirmeyi ve klinik bulguların yaşa göre değişkenlik gösterip göstermediğini belirlemeyi amaçladık.

Yöntem: 0-18 yaşları arasında toplam 104 kesin COVID-19 hastası geriye dönük olarak analiz edildi. Çalışma dönemi 15 Mart 2020-1 Temmuz 2020 idi. Kesin COVID-19 vakası, gerçek-zamanlı reverse transkripsiyon polimeraz zincir reaksiyonu (rRT-PCR) testinin ağır akut solunum sendromu-koronavirüs-2 (SARS-CoV-2) enfeksiyonu için pozitif saptanması olarak tanımlandı. Hastalar demografik özellikleri, epidemiyolojik risk faktörleri, klinik bulguları, laboratuvar ve görüntüleme sonuçları ve klinik sonuçları açısından analiz edildi.

Bulgular: Hastaların medyan yaşı (çeyrekler arası genişlik) 11,8 (8,4) yıl olup, 53'ü (%51) erkekti. Hastaların 98'inde (%94) epidemiyolojik risk faktörü vardı. En sık görülen semptomlar öksürük (%62), ateş (%42) ve yorgunluk (%33) idi. Hastaların 7'si (%7) asemptomatik, 84'ü (%81) hafif, 9'u (%9) orta ve 4'ü (%4) ağır/kritik olarak sınıflandırıldı. Hastaların 98'ine (%94) akciğer grafisi çekildi ve %12'sinde pnömoni saptandı. Beş yaşından küçük hastalarda ateş ($p = 0.019$), burun akıntısı ($p = 0.041$) ve ishal ($p = 0.035$) sıklığı daha fazlaydı. Kas/eklem ağrısı (%26), koku/tat kaybı (%20) ve baş ağrısı (%19) ise 5 yaşından büyük hastalarda en sık görülen solunum dışı semptomlar arasındaydı. Hastaların %8'i hastaneye, %4'ü çocuk yoğun bakım ünitesine yatırıldı. Ölüm saptanmadı.

Sonuç: Pediyatrik COVID-19 vakalarının çoğunda pnömoni olmaksızın hafif hastalık bulguları gelişir. Hastalar karakteristik belirtiler olarak kabul edilen ateş ve öksürük ile başvurmayabilir, belirti ve bulgular yaşa göre değişkenlik gösterebilir. Beş yaşından küçük çocuklarda ateş, burun akıntısı ve ishal görülme sıklığı daha fazladır. Okul çağı çocukları ve ergenler kas/eklem ağrısı, koku/tat kaybı, ve baş ağrısı gibi solunum dışı belirtilerle başvurabilir.

Anahtar kelimeler: COVID-19, SARS-CoV-2, çocuk, klinik özellikler

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INTRODUCTION

In mid-December 2019, a new respiratory tract infection appeared in Wuhan, Hubei province, China. The virus isolated from the lower respiratory tract of the patients showed that this was a new type of coronavirus ⁽¹⁾. The etiologic agent was called as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), and the disease was named as coronavirus disease-2019 (COVID-19) by World Health Organization. It caused an epidemic throughout China, followed by a rapidly spreading in other countries throughout the world. On March 11, 2020, WHO declared that COVID-19 caused a pandemic ⁽²⁾. In Turkey, the first COVID-19 case was detected on March 11, 2020 and Istanbul province has become an epicenter with the greatest number of patients in the country ⁽³⁾.

Current evidence show that children of all ages are susceptible to be infected with SARS-CoV-2 but are less likely to be symptomatic or develop severe symptoms compared to the adults ⁽⁴⁻⁹⁾. However, life-threatening severe manifestations such as multisystem inflammatory syndrome in children (MIS-C), severe pneumonia, acute respiratory distress syndrome (ARDS), myocarditis, shock, coagulation dysfunction, and death can rarely occur ⁽⁸⁻¹¹⁾. As experience and data on COVID-19 have been increasing worldwide, new signs and symptoms are being

identified other than fever and respiratory findings. In this study, we aimed to evaluate the demographic, epidemiological, and clinical characteristics of the children admitted to our hospital and diagnosed with COVID-19, and to determine variations of the clinical presentation of the disease by age.

MATERIALS AND METHODS

Design, Setting, and Definitions

This retrospective observational cohort study was conducted in a tertiary care hospital in Istanbul, Turkey, which became one of the pandemic hospitals. The confirmed COVID-19 patients admitted and treated in the pediatric emergency department (PED), inpatient ward, or pediatric intensive care unit (PICU) were included. The study period was between March 15, 2020 and July 1, 2020. The study was approved by the Institutional Ethics Committee of the hospital.

A suspected COVID-19 case was defined in accordance with our national guideline which has been prepared and intermittently revised by the "COVID-19 Scientific Board" as new information has emerged about the disease. A confirmed COVID-19 case was defined as a child with positive real-time reverse transcription-polymerase chain reaction (rRT-PCR) test result for SARS-CoV-2 infection ⁽¹²⁾. During the study period, indications for rRT-PCR

Table 1. Indications of rRT-PCR Sampling for SARS-CoV-2*

Criteria	Description
Epidemiological features (I)	Having a household member hospitalized with a diagnosis of respiratory tract infection within the last 14 days Having a household member diagnosed with COVID-19 Having a household member with fever and cough or suffering from respiratory distress either fever or not Having a contact history with an individual diagnosed with COVID-19
Signs and symptoms (II)	Presence of a fever history or a measured body temperature of $\geq 38.0^{\circ}\text{C}$ Presence of abnormal lung auscultation findings Presence of tachypnea Presence of new onset cough Having an oxygen saturation of 92% or lower in room air Presence of diarrhea
rRT-PCR testing is indicated	The presence of at least one of each of I and II The presence of at least two of II (for each item, failure to indicate any association with another reason) Presence of two or more people with COVID-19 diagnosis in the same household Infants under 9 months who have a mother diagnosed with COVID-19 Newborns whose mother diagnosed with COVID-19 during pregnancy

*Adopted from The Republic of Turkey Ministry of Health Directorate General of Public Health COVID-19 Guide ⁽¹²⁾.

COVID-19: Coronavirus Disease-2019, rRT-PCR: Real-time reverse transcription-polymerase chain Reaction, SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus-2

Table 2. Disease severity*

Criteria	Description
Asymptomatic	No signs or symptoms AND normal chest X-ray, if performed
Mild	Symptoms of upper respiratory tract infection and/or gastrointestinal involvement AND no hypoxemia and respiratory distress AND no physical examination findings consistent with pneumonia AND normal chest X-ray, if performed
Moderate	No hypoxemia and respiratory distress AND pneumonia on chest X-ray with or without positive clinical findings OR sick appearance (such as poor feeding, dehydration)
Severe	Respiratory distress OR hypoxemia (oxygen saturation < 92%) OR need for respiratory support
Critical	Respiratory failure OR need for intensive care admission OR shock, OR encephalopathy, myocardial injury or heart failure, coagulation disorders, acute kidney injury

*Adapted from Dong Y et al, and Chen ZM et al ^(4,14).

sampling were shown in Table 1. The definitions of anemia, leukocytosis, leukopenia, lymphopenia, and thrombocytopenia were made based on lower and upper limit values of these parameters varying according to age ⁽¹³⁾. Severity of COVID-19 was categorized adapting previous published classifications ^(4,14) (Table 2).

Study Population and Data Collection

A total of 104 patients aged between 0-18 years with confirmed COVID-19 diagnosis during the study period were retrospectively analyzed. The patients older than 18 years or having missing medical data were excluded. The data of the patients was extracted from the medical database of the hospital and PED charts.

Procedures

A combined nasal and oropharyngeal swab samples were collected for rRT-PCR assay and were transported to the laboratories that had been authorized by the General Directorate of Public Health ⁽¹²⁾. The test was repeated within 48 hours for all patients admitted to the hospital and whose first test results were negative.

Laboratory analysis was performed in patients with moderate, severe, and critical disease, in patients with underlying comorbidities, and in all patients less than one year old. Chest x-ray was performed in all symptomatic patients. Computed tomography (CT) was performed only in patients with severe and

critical disease condition and when the respiratory system findings could not be explained with chest x-ray. The patients who were discharged from the hospital were quarantined with their families for two weeks and followed up daily by their family doctors.

Statistical Analysis

The statistical analyzes and graphics were performed using The Statistical Package for Social Sciences (SPSS) version 22.0 (IBM Corp., Armonk, NY). The patients were analyzed in terms of demographic variables, epidemiological risk factors, initial clinical findings, baseline laboratory and imaging results, and clinical outcomes. Shapiro Wilk test was used to determine whether continuous variables were normally distributed, and the homogeneity of variances was evaluated by Levene test. Continuous variables were expressed as means and standard deviations or as median and inter-quartile ranges (IQR), if not normally distributed. Categorical data were expressed as counts and percentages. When comparing numerical variables, Student's t-test was used for normally distributed data and Mann-Whitney U test was used for non-normally distributed data. The chi-square test or Fisher's exact probability test was used to compare qualitative data. The results were considered significant at a p level < 0.05.

RESULTS

The median age (IQR) of the patients was 11.8 (8.4) years, and 53 (51%) were male. Ninety-eight (94%)

Table 3. Baseline characteristics of the patients

Variable	Overall n = 104	> 5 years n = 85	≤ 5 years n = 19	P
Gender[†]				
Male	53 (51.0)	44 (51.8)	9 (47.4)	0.803
Comorbidities[†]	11 (10.6)	11 (12.9)	0 (0.0)	0.209
Epidemiological history[†]	98 (94.2)	82 (96.5)	16 (84.2)	0.073
Systemic symptoms				
Highest temperature, (°C) [‡]	37.0 (1.5)	37.0 (1.5)	38.0 (1.8)	0.034*
Fever, (≥ 38°C) [‡]	44 (42.3)	31 (36.5)	13 (68.4)	0.019*
Fatigue [†]	34 (32.7)	27 (31.8)	7 (36.8)	0.788
Muscle or joint pain ^{†,§}	-	22 (25.9)	-	N/A
Loss of appetite [†]	31 (29.8)	22 (25.9)	9 (47.4)	0.094
Headache ^{†,§}	-	16 (18.8)	-	N/A
Respiratory symptoms[†]				
Cough	64 (61.5)	51 (60.0)	13 (68.4)	0.606
Shortness of breath	8 (7.7)	7 (8.2)	1 (5.3)	>0.999
Otorhinolaryngological symptoms[†]				
Sore throat [§]	-	16 (18.8)	-	N/A
Rhinorrhea	5 (4.8)	2 (2.4)	3 (15.8)	0.041*
Loss of smell or taste [§]	-	17 (20.0)	-	N/A
Gastro-intestinal symptoms[†]				
Nausea/vomiting	8 (7.7)	7 (8.2)	1 (5.3)	>0.999
Diarrhea	8 (7.7)	4 (4.7)	4 (21.1)	0.035*
Abdominal pain	5 (4.8)	5 (5.9)	0 (0.0)	0.582
Vital parameters[†]				
Hypoxemia	2 (1.9)	2 (2.4)	0 (0.0)	>0.999
Tachypnea	5 (4.8)	4 (4.7)	1 (5.3)	>0.999
Tachycardia	28 (26.9)	26 (30.6)	2 (10.5)	0.091
Hypotension	0 (0.0)	0 (0.0)	0 (0.0)	-
Lung auscultation[†]				
Crackles	6 (5.8)	4 (4.7)	2 (10.5)	0.301
Rhonchi	2 (1.9)	2 (2.4)	0 (0.0)	>0.999
Decreased sounds	1 (1.0)	1 (1.2)	0 (0.0)	>0.999
Chest X-ray				
Suggestive of pneumonia	n = 98 12 (12.2)	n = 79 10 (12.7)	n = 19 2 (10.5)	>0.999
Disease severity[†]				
Asymptomatic	7 (6.7)	6 (7.1)	1 (5.3)	0.253
Mild	84 (80.8)	70 (82.3)	14 (73.6)	
Moderate	9 (8.6)	7 (8.2)	2 (10.5)	
Severe to critical	4 (3.8)	3 (3.5)	1 (5.3)	
Respiratory support[†]				
Face mask oxygen	2 (0.9)	1 (1.2)	0 (0.0)	0.458
NIV/HFNCO	2 (1.9)	1 (1.2)	1 (5.3)	
IMV	0 (0.0)	0 (0.0)	0 (0.0)	
Clinical decision[†]				
Discharged from PED	92 (88.5)	79 (92.9)	13 (68.4)	0.005*
Hospitalization	8 (7.7)	3 (3.5)	5 (26.3)	
ICU admission	4 (3.8)	3 (3.5)	1 (5.3)	
Mortality[†]	0 (0.0)	0 (0.0)	0 (0.0)	-

*p < 0.05 is statistically significant.

[†]Values are presented as number (%).

[‡]Values are presented as median (interquartile range).

[§]Values are applicable in children > 5 years.

COVID-19: Coronavirus disease-2019, HFNCO: High flow nasal cannula oxygen, ICU: Intensive care unit, IMV: Invasive mechanical ventilation, NA: not available, NIV: Noninvasive mechanical ventilation, PED: Pediatric emergency department

of the patients had an epidemiological risk factor. The most frequent symptoms were cough (62%), fever (42%), and fatigue (33%). The frequency of various signs and symptoms of lower respiratory tract infection (shortness of breath, tachypnea, hypoxemia, lung auscultation findings) was 2-8%. Gastrointestinal symptoms were observed in 5-8% of the patients (Table 3).

Out of the 104 patients, 7 (7%) were younger than 1 year of age, 12 (11%) were between 1-5 years of age and 85 (82%) were older than 5 years of age. It was found that patients younger than 5 years old were more likely to have fever $\geq 38^{\circ}\text{C}$ ($p = 0.019$), rhinorrhea ($p = 0.041$), and diarrhea ($p = 0.035$), and their maximum body temperature was higher ($p = 0.034$) than the patients older than 5 years. On the other hand, muscle or joint pain (26%), loss of smell or taste (20%), and headache (19%) were among the most common extra-pulmonary symptoms in patients older than 5 years (Table 3).

Regarding the disease severity of positive cases; 7 (7%) were asymptomatic, 84 (81%) were mild, 9 (9%) were moderate, and 4 (4%) were in severe or critical condition. Ninety-eight (94%) of the patients underwent a chest x-ray, and only 12% had pathological findings consistent with pneumonia. Only 5 (5%) of the patients underwent a chest CT. There was no significant difference between the age groups in

terms of the presence of pneumonia and disease severity. However, the frequency of hospitalization was higher in the patients younger than 5 years (26% vs 4%, $p = 0.005$). When the course of the disease was evaluated, a total of 88% of the patients were discharged from the PED, 8% of the patients were hospitalized at the inpatient COVID-19 ward, and 4% were admitted to the PICU. Only 3% of the patients received respiratory support and none was intubated. No death occurred (Table 3). No patient was diagnosed with MIS-C during the study period. Baseline laboratory findings of the patients were shown in Table 4.

DISCUSSION

Data from China showed that most of the children (75-90%) with COVID-19 had a documented family contact history^(5,15). In European studies, 50-60% of the children with COVID-19 had a family contact history which was lower than Chinese findings, probably due to the late lockdown^(16,17). In Turkey, schools were closed immediately after the detection of the first case in the country, and home isolation for children had been implemented starting from the beginning of the outbreak. In different pediatric studies reported from Turkey, exposure has been reported in 90-99%^(18,19). Similarly, in our case series, the source of infection in almost all children with COVID-19 was a household member or an immediate family mem-

Table 4. Baseline laboratory findings of the patients

Variable	Overall n = 24	> 5 years n = 16	≤ 5 years n = 8	P
Anemia	4 (16.7%)	3 (18.8%)	1 (12.5%)	>0.999
Thrombocytopenia	3 (12.5%)	3 (18.8%)	0 (0.0%)	0.526
Leukocytosis	2 (8.3%)	1 (6.3%)	1 (12.5%)	>0.999
Leukopenia	3 (12.5%)	3 (18.8%)	0 (0.0%)	0.526
Neutropenia	2 (8.3%)	2 (12.5%)	0 (0.0%)	0.536
Lymphopenia	5 (20.8%)	4 (25.0%)	1 (12.5%)	0.631
CRP elevation	8 (33.3%)	5 (31.3%)	3 (37.5%)	>0.999
PCT elevation	0 (0.0%)	0 (0.0%)	0 (0.0%)	N/A
Troponin elevation	2 (8.3%)	2 (12.5%)	1 (12.5%)	>0.999
CK elevation	1 (4.2%)	1 (6.3%)	0 (0.0%)	0.532
LDH elevation	5 (20.8%)	3 (18.8%)	2 (25.0%)	0.624
Hepatic dysfunction	2 (8.3%)	1 (6.3%)	1 (12.5%)	>0.999
Renal dysfunction	2 (8.3%)	2 (12.5%)	0 (0.0%)	0.536

Values are presented as number (%). CK: Creatine kinase, CRP: C-reactive protein; LDH: Lactate dehydrogenase, NA: Not available, PCT: Procalcitonin

ber. We have found no gender difference in line with the literature ^(4,8,9,17).

The clinical presentations of COVID-19 in children are diverse. Although the frequency of the typical symptoms of acute respiratory infections including fever and cough was less reported in pediatric COVID-19 patients than adults, fever and cough are still the most common signs and symptoms of the disease occurring in almost half of the pediatric patients. Fatigue was also common reported ^(7-9,14-17,20,21). Being in line with the studies, our results demonstrated that the most common symptoms in children with COVID-19 were cough, fever, and fatigue determined in almost two-third, a half, and one-third of the patients, respectively.

The current evidence shows that the majority of the children with COVID-19 have mild disease and are less likely to progress severe acute respiratory distress syndrome, respiratory failure, septic shock, metabolic acidosis and coagulopathy which can develop more common in adults ⁽⁴⁻⁹⁾. The frequency of respiratory distress was 5-13% in different pediatric COVID-19 studies ^(4,7,8,20,21). The large pediatric series from China showed that only 0.6% of the patients progressed to ARDS or multiple organ dysfunction ⁽⁴⁾. In two pediatric studies from Turkey, dyspnea or tachypnea were observed less than 5% of the patients ^(18,19). Similarly, the majority of our patients (81%) had mild disease. The frequency of shortness of breath and tachypnea was less than 10%, and only one patient (1%) progressed to ARDS.

Children with COVID-19 can present with extra-pulmonary symptoms. Among them, gastrointestinal symptoms (10-25%), fatigue or muscle pain (10-25%), and headache (10-30%) were mainly reported ^(5-9,15-17,20,21). In our study, fatigue was the most common extra-pulmonary symptom which was observed in one-third of the patients. Gastrointestinal symptoms were less frequent (5-8%). Muscle or joint pain and headache were evaluated only in children older than 5 years old, and were determined in 26% and 19% of the patients, respectively.

A sudden-onset smell or taste loss is another extra-pulmonary symptom in COVID-19 which was first described in adult patients ⁽²²⁻²⁴⁾. In contrast to other acute viral smell impairment, COVID-19-associated

smell loss is usually not with concomitant nasal obstruction ^(22,23). It was argued that loss of smell and taste is a potential clinical predictor of COVID-19 in adults ^(23,25,26). However, there is limited information on smell and/or taste disorders in pediatric COVID-19, and were not mentioned in most of the large pediatric case series ^(7-9,17,20,27). Qiu et al ⁽²⁸⁾ firstly reported that approximately one third of the infected children older than 6 years presented with smell and/or taste loss, and a quarter of these patients had no additional symptoms. In our study, 20% of the patients older than 5 years (varying from 8.8-17.9 years) reported loss of smell or taste, and concomitant nasal obstruction was found only in one case.

We found some differences concerning the frequency of symptoms with regard to age. The patients younger than 5 years presented more frequently with fever, rhinorrhea, and diarrhea. On the other hand, muscle or joint pain, loss of smell or taste, and headache were striking extra-pulmonary symptoms in children older than 5 years.

It is known that children with COVID-19 are less likely to be hospitalized when compared to adult patients ⁽⁸⁾. However, a wide range of hospitalization (5.7-62%) and PICU admission rates (0.6-9.7%) was reported from different countries ^(7,8,15,17,29). It was argued that this difference may rise from the use of different criteria for admission to the hospital or PICU, the number of children with underlying conditions, or different host responses to the infection ^(16,29). In one of the largest series in children with COVID-19, the proportions of severe and critical cases were higher in cases under 5 years old, especially in infants ⁽⁴⁾. In USA, children younger than one year old had the highest percentage of hospitalization ⁽⁷⁾. In another study, being younger than one month was found to be associated with ICU admission ⁽¹⁷⁾. In our series, only 8% of the patients were hospitalized and 4% were admitted to the PICU. Although the rate of hospitalization was significantly higher in cases less than 5 years (26% versus 4%), it was more likely due to the physicians' concern to observe the course of the disease closely in this group, rather than the severity of the disease.

In laboratory, lymphocytopenia were common in adult patients with COVID-19 ⁽³⁰⁾. In contrast to adult

data, complete blood counts are usually normal in children with COVID-19 although lymphopenia, leucopenia, and leukocytosis were reported in some case series^(8,9,14,20). The frequency of C-reactive protein (CRP) or procalcitonin elevation has been reported between 10-30%⁽⁹⁻²⁰⁾. In our study, the most common abnormality in the leukocyte counts was lymphopenia (21%). About one-third of the patients had elevated CRP levels. A previous study reported that the children older than 5 years old had decreased lymphocytes, elevated procalcitonin, and decreased creatine kinase levels compared with the younger patients⁽³¹⁾. Our laboratory test results did not demonstrate any difference between the age groups.

Chinese studies mainly involving mild to moderate pediatric COVID-19 cases reported that half to two-thirds of the cases who underwent lung tomography had pneumonia^(5,15,31). In a multinational European study, approximately one third of the cases underwent a chest x-ray, and almost half had findings consistent with pneumonia⁽¹⁷⁾. In our study, we evaluated all symptomatic patients with chest x-ray, and 12% revealed pneumonia. However, it is known that chest X-ray may fail to identify typical lesions⁽²⁰⁾. Therefore, the cases of subclinical pneumonia without clinical and x-ray findings may have not been identified as we rarely used chest computed tomography to avoid radiation exposure.

The study has some limitations. First, this was a single-center, retrospective study. Second, a blood sampling which is an invasive procedure in children was not obtained from any of the patients who were asymptomatic or who had a mild clinical condition unless there was any of the underlying comorbidities or risk factors, or a clinical requirement observed by the physician. These limitations led to a small sample size.

CONCLUSION

Our results demonstrated that the most of the pediatric COVID-19 cases had mild symptoms without pneumonia. They may not present with fever or cough which are considered characteristic symptoms of the disease, and the frequency of signs and symptoms may vary by age. While children younger than 5 years old are more likely to have fever, rhinorrhea,

and diarrhea, school-age children and adolescents may present with extra-pulmonary symptoms such as muscle or joint pain, smell or taste loss, and headache.

Ethics Committee Approval: Istanbul Medeniyet University Faculty of Medicine Ethics Committee approval was received (01/07/2020; 2020/0434).

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