Orijinal Araştırma / Original Investigation
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Thoracic Computed Tomography Findings of Pediatric Covid-19 Cases According to Age Groups

Yaş Gruplarına Göre Pediatrik COVID-19 Vakalarının Torasik Bilgisayarlı Tomografi Bulguları

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ÖZET

AMAÇ: Bu çalışmada, yeni koronavirüs hastalığı 2019 (COVID-19) pnömonisi olan pediatrik hastalarda torasik bilgisayarlı tomografi (BT) bulgularını yaş gruplarına göre değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEM: Nisan 2020 ile Eylül 2020 tarihleri arasında kliniğimize başvuran, yaşları 0 ile 18 arasında değişen toplam 105 hasta geriye dönük olarak incelendi. Kesin tanı, nazofarenks/orofarenks sürüntülerinden yapılan ters transkriptaz-polimeraz zincir reaksiyonu (RT-PCR) testiyle belirlendi. Hastalar, yaşlarına göre üç gruba ayrıldı: 0-6, 6-12 ve 12-18 yaş. Başvuru anındaki toraks BT bulguları değerlendirildi.

BULGULAR: Hastaların 51'inde COVID-19 için RT-PCR pozitifliği tespit edilirken, 54'ünde RT-PCR negatiflik saptandı. RT-PCR pozitif olan hastaların 30'u (%58.8) normal BT sonucuna sahipken, 21 hastada (%41.2) akciğer tutulumu gözlendi. En yaygın torasik BT bulguları, bilateral akciğer tutulumu (%27.5), alt lob tutulumu (%31.4), nodüler tutulum (%31.4) ve buzlu cam opasitesi (%37.3) idi. 6-12 yaş grubunda, orta lob tutulumu anlamlı derecede daha sık görüldü (p=0.041). Konsolidasyon oranı yaş arttıkça anlamlı derecede azaldı (p=0.045).

SONUÇ: Pediatrik COVID-19 vakalarında en yaygın BT bulguları bilateral, periferik alt lob tutulumuydu. Konsolidasyon, 0-6 yaş grubunda en sık görülen lezyondu ve bu durum bu yaş grubunda yüksek oranda bakteriyel ko-enfeksiyonun varlığına bağlanabilir. 12-18 yaş grubunda lezyonların dağılımı, morfolojisi ve opaklık derecesi, yetişkinlerde görülenlerle benzerdi. Lezyonlar, 6-12 yaş ve 12-18 yaş gruplarında nodüler ve buzlu cam opasitesi desenleriyle kendini gösterdi.

Anahtar Kelimeler: COVID-19, pediatrik görüntüleme, bilgisayarlı tomografi, pnömoni

ABSTRACT

OBJECTIVE: In this study, we aimed to evaluate thoracic computed tomography (CT) findings of pediatric patients with novel coronavirus disease 2019 (COVID-19) pneumonia according to age groups.

MATERIALS AND METHODS: 105 patients aged between 0 and 18 years who were admitted to our clinic between April 2020 and September 2020 were retrospectively analyzed. The definitive diagnosis was established by reverse transcriptase-polymerase chain reaction (RT-PCR) testing of the combined nasopharyngeal/oropharyngeal swabs. The patients were divided into three groups according to age: 0-6, 6-12, and 12-18 years. Thoracic CT findings at the time of initial admission were evaluated.

RESULTS: Of the patients, 51 had RT-PCR positivity for COVID-19, while 54 had RT-PCR negativity. Of the RT-PCR-positive patients, 30 (58.8%) had normal CT, while lung involvement was observed in 21 patients (41.2%). The most common thoracic CT findings were bilateral lung involvement (27.5%), lower lobe involvement (31.4%), nodular involvement (31.4%), and ground-glass opacity (37.3%). In the 6-12 age group, middle lobe involvement was significantly more frequent (p=0.041). The rate of consolidation significantly decreased with the increasing age (p=0.045).

CONCLUSION: The most common CT findings were bilateral, peripheral lower lobe involvement in pediatric COVID-19 cases. Consolidation was the most frequent lesion in the 0-6 age group, which can be attributed to the high incidence of bacterial co-infection. In the 12-18 age group, the distribution, morphology, and opacity of the lesions were comparable with those seen in adults. The lesions presented with nodular and ground-glass opacity patterns in the 6-12 and 12-18 age groups.

Keywords: COVID-19, pediatric imaging, computed tomography, pneumonia

INTRODUCTION

Novel coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome-coronavirus 2 (SARS-

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CoV-2) is a highly contagious disease.1 Although the most common clinical symptoms are fever and dry cough in adults, non-specific symptoms including dyspnea, headache, myalgia, loss of taste and smell, and fatigue may be also present.2 Most of pediatric patients present with atypical signs and symptoms with a milder course than adults. The majority of cases have asymptomatic disease or upper respiratory tract symptoms such as fever, dry cough, fatigue, runny nose, and nasal obstruction. In some cases, gastrointestinal symptoms including abdominal pain, nausea/vomiting, and diarrhea may develop.3 Although many children have a milder clinical course, multifocal pneumonia progressing to respiratory failure, multisystem immune-mediated inflammatory disease (MIS-C) have been also reported in the literature.4 In rare cases, acute respiratory distress syndrome, septic shock, metabolic acidosis, and coagulation disorders have been also described.5

In general, COVID-19 presents with a more severe clinical course in adults than children. Viral respiratory infections are usually more severe in children and are the leading cause of hospital admission, hospitalization, and mortality worldwide.6,7 Therefore, the lung disease pattern of COVID-19 varies according to age groups.

Thoracic imaging is the cornerstone of early diagnosis and treatment of COVID-19. The most common imaging tools are chest X-rays and computed tomography (CT).8 Several studies and recent meta-analyses have demonstrated that ground-glass opacity (GGO) is the most common thoracic CT finding in both adults and children infected with COVID-19.9-12

In the literature, COVID-19-related pulmonary findings in pediatric cases have been reported extensively. In the present study, we aimed to evaluate thoracic CT findings of pediatric patients with COVID-19 pneumonia according to age groups.

MATERIAL & METHODS

Study design and study population

This single-center, retrospective cohort study was conducted at the Department of Radiology of a tertiary care center between April 2020 and September 2020. A total of 105 patients aged between 0 and 18 years who were admitted to our clinic throughout the study period were screened using the hospital database. These patients consisted of symptomatic patients who were suspected of COVID-19 pneumonia or under the filiation follow-up (symptomatic/asymptomatic, contact with a COVID-19 patient). All patients underwent non-contrast-enhanced thoracic CT and reverse transcriptase-polymerase chain reaction (RT-PCR) testing. The patients were divided into three groups according to age: 0-6, 6-12, and 12-18 years. When classifying the pediatric population according to age groups, we categorized them as follows: 0-6 years for the preschool period (infancy and early childhood), 6-12 years for the school period (middle childhood), and 12-18 years for the adolescent period. Taking into account that each age group has unique cognitive and behavioral development, body temperature regulation, airway anatomy, cardiovascular physiology, immune function, and musculoskeletal system development, we considered that the presentation of the disease could vary among different age groups. Thoracic CT findings at the time of initial admission were evaluated.

The definitive diagnosis was established by RT-PCR testing of the combined nasopharyngeal/oropharyngeal swabs. The samples were isolated in the RNA vNAT solution (Bioeksen, Istanbul, Turkey). The Rotor-Gene Q (Qiagen, Antwerp, Belgium) device and Biospeedy SARS-CoV-2 RT-qPCR kit (Bioeksen, Istanbul, Turkey) were used. The results were analyzed using the Rotor-Gene Q (Qiagen, Hilden, Germany) software.

Imaging protocol

Non-contrast-enhanced thoracic CT was performed using the SOMATOM Perspective Scanner (Siemens Healthineers, Germany) using a slice thickness of 5 mm, tube potential of 110 kV, and a reference current of 35 mAs. The noise index using an automated milliampere technology (20 to 350 mA) was 110 kV tube voltage. The display field of view was 37.5x37.5 cm, and the window width/level was 50-350 HU for the lung and -600 to 1200 HU for the mediastinum. The images were acquired in axial, coronal, and sagittal planes. According to age and clinical symptoms of the patients, a standard-dose or low-dose image acquisition protocol was followed while acquiring CT scans of the thorax without contrast enhancement. Follow-up imaging studies were performed in the presence of clinical progression, secondary cardiopulmonary diseases, bacterial superinfection, and suspected pulmonary embolism,

although follow-up images were excluded. In case of suspected cases with pulmonary embolism, contrast-enhanced CT angiography was used considering renal functions of the patient. The images were taken while calm in young children and using breath-hold technique at full inspiration in older children. Epidemiological and demographic characteristics of the patients, clinical and laboratory parameters, and radiological study results including thoracic CT scans were retrieved retrospectively from the hospital database. Thoracic CT scans were evaluated on the Picture Archiving and Communication System (PACS). Thoracic CT scans were evaluated by two radiologists with a 12-year experience on thoracic radiology. Pathological findings were defined by the two radiologists using the international standard terminology from the Fleischner Society's Glossary of Chest Imaging Terms. 13

Assessment and definitions

The definitions of the CT findings were based on the Glossary of Terms for Thoracic Imaging of the Fleischner Society.

Variables used in detailed analysis and evaluation of the lesions defined on thoracic CT scans were as follows: the affected lung side (right, left, bilateral), number of involved lobes (upper lobe of right lung, middle lobe of right lung, lower lobe of left lung, lingular segment of left lobe, lower lobe of left lung), number of lesions (single, multiple), the lung field involved (peripheral, central, mixed) lesion density/opacity, parenchymal infection pattern (nodular, patchy, coalescent areas with GGO, focal, segmental-lobar consolidation, peribronchial thickening, crazy-paving pattern), and additional findings (marked interstitium, marked vascularization within the lesion, halo sign, reversed halo sign, pleural effusion, lymphadenopathy [LAP]). The distribution of lung lesions was defined as follows: peripheral, outer one-third of the lung and inner, two-third of the central lung.

Statistical analysis

Statistical analysis was performed using the SPSS version 23.0 software 0 (IBM Corp., Armonk, NY, USA). Descriptive data were expressed in mean ± standard deviation (SD), median (min-max) or number and frequency, where applicable. The normality assumption was checked using the Shapiro-Wilk test. The Pearson chi-square test was used to compare RT-PCR-positive and RT-PCR-negative patients. The Fisher-Freeman-Halton exact test was used to examine the relationship between the RT-PCR positivity and age. A p value of <0.05 was considered statistically significant.

Ethical consideration

A written informed consent was obtained from the parents and/or legal guardians of the patients. The study protocol was approved by the institutional Ethics Committee (No: 2020-3/6). The study was conducted in accordance with the principles of the Declaration of Helsinki..

RESULTS

Of 105 patients included in the study, 57 were males and 48 were females with a median age of 13.42 (range, 0 to 18) years. Fifty-one patients had RT-PCR positivity for COVID-19, while 54 patients had RT-PCR negativity. Of the RT-PCR-positive patients, 30 (58.8%) had normal CT, while lung involvement was observed in 21 patients (41.2%). Of the RT-PCR-negative patients, 41 (75.9%) had normal CT, while lung involvement was observed in 13 patients (24.1%) (Table 1).

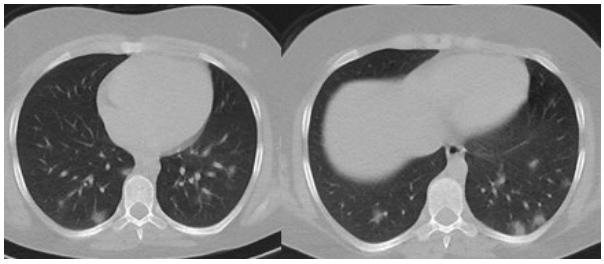
Table 1. *Consistency between RT-PCR and CT findings*

			RT-PCR		Total
			Negative	**Positive**	
Normal CT	No	n	13	21	34
		% (CT)	38,2	61,8	
		% (RT-PCR)	24,1	41,2	
	Yes	N	41	30	71
		% (CT)	57,7	42,3	
		% (RT-PCR)	75,9	58,8	
Total			54	51	105

RT-PCR: reverse transcriptase-polymerase chain reaction; CT: computed tomography

Clinical symptoms and imaging findings of RT-PCR-positive patients are shown in Table 2. According to age groups, there were six patients in the 0-6 age group, seven in the 6-12 age group, and 38 patients in the 12-18 age group. The most common clinical symptoms were fever and dry cough. The most common thoracic CT findings in this group were bilateral lung involvement (27.5%), lower lobe involvement (31.4%), nodular involvement (31.4%), and GGO (37.3%) (Figure 1).

Figure 1. *A 13-year-old girl admitted with fever, abdominal pain for three days. There is a close contact with a COVID-19-infected family member. PCR(+). On imaging study, there are ground-glass opacities at varying degrees, mostly in the peripheral lung of bilateral lower lobes.*



Thoracic CT findings of PCR-RT-positive patients according to age groups are given in Table 3. In the 6-12 age group, middle lobe involvement was significantly more frequent (p=0.041) (Figure 2). The rate of consolidation significantly decreased with the increasing age (p=0.045) (Figure 3).

Figure 2. A. *A 10-year-old boy admitted with cough and fever. There is a close contact with a COVID-19-infected family member. PCR(+). On imaging study, a halo sign is observed as a ground-glass opacity surrounding the consolidation area in the middle lobe of the right lung and air bronchogram in the posterobasal segment of the left lower lobe of the lung.* ***B.*** *There is pleural thickening in the superior segment of the lower lobe of the right lung.*

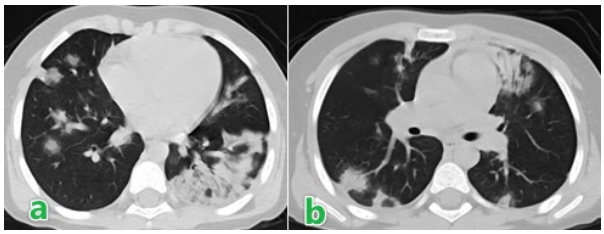
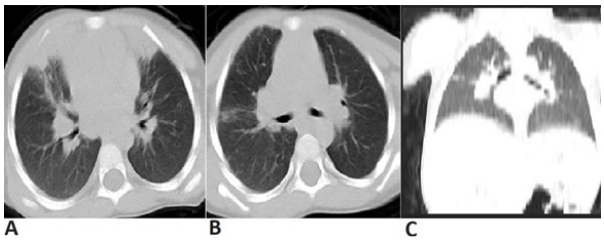


Figure 3. A. *A 4-year-old boy admitted with fever and cough for three days. PCR(+). On imaging study, there is bilateral paracardiac consolidation.* ***B, C.*** *Ground-glass opacity in the middle lobe of the right lung.*



DISCUSSION

In the present study, we evaluated thoracic CT findings of pediatric patients with COVID-19 pneumonia according to age groups using RT-PCR testing. Our study results showed that 51 patients tested COVID-19-positive and, of these patients, 30 (58.8%) had normal CT scans and 21 (41.2%) had lung involvement. In the RT-PCR-negative group, 41 of 54 patients (75.9%) had normal CT scans, while findings compatible with COVID-19 pneumonia were observed in 13 (24.1%).

Table 2. *Clinical symptoms and imaging findings of RT-PCR-positive patients*

		n	%
Age group, year	0-6	6	11,8
	6-12	7	13,7
	12-18	38	74,5
Sex	Female	25	49,0
	Male	26	51,0
Cough	No	16	31,4
	Yes	35	68,6
Fever	No	19	37,3
	Yes	32	62,7
Sore throat	No	48	94,1
	Yes	3	5,9
Dyspnea	No	37	72,5
	Yes	14	27,5
Diarrhea	No	45	88,2
	Yes	6	11,8
Nausea	No	44	86,3
	Yes	7	13,7
Loss of smell	No	48	94,1
	Yes	3	5,9
Headache	No	44	86,3
	Yes	7	13,7
Fatigue	No	38	74,5
	Yes	13	25,5
Myalgia	No	47	92,2
	Yes	4	7,8
Suspected contact with a COVID-19 patient	No	14	27,5
	Yes	37	72,5
Bilateral lung involvement	No	37	72,5
	Yes	14	27,5
Right lung involvement	No	48	94,1
	Yes	3	5,9
Left lung involvement	No	48	94,1
	Yes	3	5,9
Multilobar involvement	No	45	88,2
	Yes	6	11,8
Lower lobe	No	35	68,6
	Yes	16	31,4
Middle lobe	No	50	98,0
	Yes	1	2,0
Upper lobe	No	48	94,1
	Yes	3	5,9
Central	No	50	98,0
	Yes	1	2,0
Peripheral	No	36	70,6
	Yes	15	29,4
Patchy	No	46	90,2
	Yes	5	9,8
Nodular	No	35	68,6
	Yes	16	31,4
GGO	No	32	62,7
	Yes	19	37,3
Consolidation	No	42	82,4
	Yes	9	17,6
Reversed halo sign	No	50	98,0
	Yes	1	2,0
Crazy-paving pattern	No	51	100,0
	Yes	0	0,0
Air bronchogram	No	51	100,0
	Yes	0	0,0
Tree-in-bud sign	No	51	100,0
	Yes	0	0,0
Interlobular septal thickening	No	51	100,0
Pleural effusion	Yes	51	100,0
LAP	No	51	100,0
	Yes	0	0,0

RT-PCR: reverse transcriptase-polymerase chain reaction; GGO: ground-glass opacity; LAP: lymphadenopathy.

Table 3. *Thoracic CT findings of PCR-RT-positive patients according to age groups*

		Age group (years)						
		0-6		6-12		12-18		
		n	%	n	%	n	%	*P**
Bilateral lung involvement	No	5	83,3	4	57,1	28	73,7	0.546
	Yes	1	16,7	3	42,9	10	26,3	
Right lung involvement	No	5	83,3	7	100,0	36	94,7	0.422
	Yes	1	16,7	0	0,0	2	5,3	
Left lung involvement	No	5	83,3	7	100,0	36	94,7	0.422
	Yes	1	16,7	0	0,0	2	5,3	
Multilobar involvement	No	6	100,0	5	71,4	34	89,5	0.251
	Yes	0	0,0	2	28,6	4	10,5	
Lower lobe	No	3	50,0	6	85,7	26	68,4	0.383
	Yes	3	50,0	1	14,3	12	31,6	
Middle lobe	No	6	100,0	6	85,7	38	100,0	**0.041**
	Yes	0	0,0	1	14,3[a]	0	0,0	
Upper lobe	No	6	100,0	6	85,7	36	94,7	0.524
	Yes	0	0,0	1	14,3	2	5,3	
Central	No	6	100,0	7	100,0	37	97,4	0.840
	Yes	0	0,0	0	0,0	1	2,6	
Peripheral	No	4	66,7	4	57,1	28	73,7	0.661
	Yes	2	33,3	3	42,9	10	26,3	
Patchy	No	6	100,0	7	100,0	33	86,8	0.387
	Yes	0	0,0	0	0,0	5	13,2	
Nodular	No	5	83,3	4	57,1	26	68,4	0.597
	Yes	1	16,7	3	42,9	12	31,6	
GGO	No	4	66,7	4	57,1	24	63,2	0.934
	Yes	2	33,3	3	42,9	14	36,8	
Consolidation	No	3	50,0	5	71,4	34	89,5	**0.045**
	Yes	3	50,0[a]	2	28,6[b]	4	10,5[c]	
Reversed halo sign	No	6	100,0	7	100,0	37	97,4	0.840
	Yes	0	0,0	0	0,0	1	2,6	
Crazy-paving pattern	No	6	100,0	7	100,0	38	100,0	--
Air bronchogram	No	6	100,0	7	100,0	38	100,0	--
Tree-in-bud sign	No	6	100,0	7	100,0	38	100,0	--
Interlobular septal thickening	No	6	100,0	7	100,0	38	100,0	--
Pleural effusion	No	6	100,0	7	100,0	38	100,0	--
LAP	No	6	100,0	7	100,0	38	100,0	--

**Fisher-Freeman-Halton exact test. RT-PCR: reverse transcriptase-polymerase chain reaction; CT: computed tomography; GGO: ground-glass opacity; LAP: lymphadenopathy.*

With the increasing patient burden, early diagnosis has become more important and imaging modalities such as thoracic CT have been more widely adopted. The presence of bilateral GGO and consolidation on thoracic CT are the imaging hallmarks which support the diagnosis; however, a normal CT scan or X-ray image does not rule out the diagnosis of COVID-19.14 Therefore, each case should be individually evaluated based on clinical, epidemiological, and radiological findings.

Some authors from China recommended thoracic CT imaging for all suspected pediatric cases; however, recent systematic reviews have not suggested using CT in mild cases with normal acute-phase reactants and oxygen saturation values.15,16 Although thoracic CT imaging is helpful in the diagnosis, it has certain disadvantages such as high-dose radiation exposure, need for sedation, and high cost, thereby precluding its utilization for children in daily practice. During the study period from April 2020 and September 2020, the early days of the pandemic, we evaluated suspected cases using chest X-ray or low-dose thoracic CT imaging. Later, we used thoracic ultrasonography and performed thoracic CT in only selected cases such as hospitalized patients, those having an underlying disease or primary/secondary immunodeficiency, having a severe clinical course, those who were unresponsive to medical treatment or with deteriorated clinical status, and prolonged duration of the RT-PCR testing.

Although thoracic CT findings are usually similar in adults and children, they are milder in the latter group. Several studies have shown that thoracic CT findings are incompatible with clinical symptoms of COVID-19 in children and the majority of asymptomatic children have thoracic CT findings suggesting COVID-19.17

Thoracic CT findings compatible with COVID-19 are different from typical viral respiratory infection findings in pediatric cases. In general, GGOs are rare in children, except for viral infections caused by cytomegalovirus, an opportunistic pathogen.18 Respiratory syncytial virus (RSV) is the most common viral pathogen in children characterized by mucosal edema, mucosal obstruction, and occlusion of the bronchus and bronchial lumen.7 It leads to distal air trapping and hyperinflation with the increased perihilar markings on chest imaging.19-22 On the contrary, COVID-19 is associated with the increased GGO on thoracic CT suggesting alveolar and interstitial infiltration without increased perihilar markings or distal air trapping. The SARS-CoV-2 enters into the host cell by binding the surface protein S (spike) to the angiotensin-converting enzyme-2 (ACE-2) receptors through the alveolar cells, intestinal, renal, cardiac, and vascular endothelial cells, resulting in alveolar epithelial injury in the lung parenchyma and exudation to varying degrees in the air space.22 As a result, GGO, consolidation or crazy-paving pattern can be seen on thoracic CT.

In a study including 171 children infected with COVID-19, GGO was seen in 32.7%, local patchy shadows in 18.7%, bilateral patchy shadows in 12.3%, and interstitial involvement in 1.2% as assessed by thoracic CT scans.3 In 20 children with COVID-19, thoracic CT scans yielded normal, unilateral, and bilateral lung involvement in 20%, 30%, and 50%, respectively. Of these patients, 60% had GGO and 50% had consolidation with a halo sign, 15% had small nodules, and 20% had spider web sign. In all patients, there were subpleural lesions; however, no LAP or pleural effusion was observed. Unlike adults, co-infection was frequent in children (40%) with a typical appearance of consolidation and halo sign.23 Acute COVID-19 presents with subpleural and lower lobe involvement, as well as predominantly peripheral GGO in children, similar to adults.24 Bayramoğlu et al.25 reported that nearly half of children with COVID-19 had consolidation with GGO on thoracic CT scans. In a meta-analysis including 850 children with COVID-19, 61.5% of the patients had GGO with consolidation.26 In the present study, the most common CT finding was GGO in RT-PCR-positive cases with bilateral, peripheral, lower lobe involvement, consistent with previous studies. In the 0-6 age group, the rates of bilateral lung involvement, right lung involvement only, and left lung involvement only were identical (16.7%), while bilateral lung involvement was more frequent in the other age groups. In the 0-6 age group, no multilobar involvement was seen, while three patients (50%) had lower lobe involvement only. In the 6-12 age group, middle lobe involvement was significantly more frequent.

Furthermore, the rate of consolidation significantly decreased with the increasing age in the current study. In the 0-6 age group, the most common lesion on thoracic CT was consolidation (50%). This can be attributed to the fact that the incidence of bacterial co-infection increases in young children. In children, anatomical structures of the tracheobronchial tree with narrower and shorter airways facilitates the deposition of small particles and microorganisms in the respiratory tract.27 In particular, viral and bacterial co-infections are more common in kindergarten and school-age children with may present with consolidation patterns on imaging studies. In a study, Charcape et al.28 divided 140 Latin American children with COVID-19 into three groups as follows: 0-6 age group (preschool, 47.1%), 6-13 age group (primary school, 30.0%), and teenage group (22.9%). According to CT findings, GGO was present in 100% of preschoolers, 90.9% of primary school age group, and 83.3% of the teenagers. The teenagers had the highest rate of consolidation, halo sign, reversed halo sign, and crazy-paving appearance in this study, unlike our study. In the current study, peripheral lung involvement was the most prevalent finding in all three age groups, while central lung involvement was observed only in one patient in the 12-18 age group. The distribution, morphology, and opacity of the lesions were comparable between the 12-18 age group and adults. In the 6-12 and 12-18 age groups, nodular lesions with GGO were more frequently seen. No pleural effusion, LAP, intralobular septal thickening, or crazy-paving pattern was observed in any of the groups. In severe COVID-19 cases, linear opacity, crazy-paving pattern, bronchial wall thickening, pericardial effusion, and mediastinal LAP are common.29 In our study, only thoracic CT images at the time of hospital admission were analyzed and severe COVID-19 cases were excluded. In the 12-18 age group, a reversed halo sign was observed in only one patient.

Nonetheless, there are some limitations to this study. First, this study has a single-center, retrospective design and the data should be treated with caution. Second, we analyzed thoracic CT images at the time of hospital admission only,

reflecting early signs of the disease. Therefore, the distribution, morphology, and opacity of the lesions in advanced cases are unknown. Third, the sample size is relatively small which precludes the generalizability of the results. Further large-scale, prospective studies are needed to confirm these findings.

In conclusion, the most common CT findings were bilateral, peripheral lower lobe involvement in pediatric COVID-19 cases. Consolidation was the most frequent lesion in the 0-6 age group, which can be attributed to the high incidence of bacterial co-infection. In the 12-18 age group, the distribution, morphology, and opacity of the lesions were comparable with those seen in adults. The lesions presented with nodular and ground-glass opacity patterns in the 6-12 and 12-18 age groups. Based on these findings, we suggest that each case should be individually evaluated based on clinical, epidemiological, and radiological findings.

Etik: Bu çalışmanın etik kurulu alınmıştır. No. 2020-3/6.

Ethics committee approval had been taken. No. 2020-3/6.

Yazar katkı durumu; HGTÖ: Kavramsallaştırma, Metodoloji, Biçimsel analiz, Yazım, Orijinal taslak, İnceleme ve düzenleme, Süpervizyon; BO: Veri toplama, Veri yorumlama; İK: İnceleme ve düzenleme, Süpervizyon. Tüm yazarlar nihai makaleyi okumuş ve onaylamıştır..

Author contribution status; HGTÖ: Conceptualization, Methodology, Formal analysis, Writing, Original draft, Review & editing, Supervision; BO: Data collection, Data interpretation; İK: Review & editing, Supervision. All authors read and approved the final manuscript..

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