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**Original paper**

# The longitudinal evaluation of COVID-19 in pediatric patients and the impact of delta variant

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## ABSTRACT

**Background:** Pediatric patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) displayed milder symptoms than adults. However, they play an important role in case numbers and virus transmission. Therefore, we aimed to determine the epidemiological features of all pediatric patients infected with SARS-CoV-2 and put forth case numbers longitudinally throughout the delta variant dominant period.

**Methods:** A retrospective study was conducted at a university hospital and included patients between 0 and18 years old with a SARS-CoV-2 polymerase chain reaction (PCR) positive result, including inpatients and outpatients. Epidemiological and clinical features were recorded from electronic files, and telephone visits were performed between March 2020 and December 2021.

**Results:** During the study period, 3175 coronavirus disease 2019 (COVID-19) pediatric patients were admitted to our hospital with a mean age of 10.61 ± 4.6 years. Of the 1815 patients who could be interviewed, 85.7% reported at least one symptom. Before the delta variant period, 0–4 years aged children were more commonly infected, while school-aged children and adolescents were more common, and the rate of pediatric cases to all COVID-19 cases increased to 35.8% after the delta variant became dominant. Symptomatic cases were significantly higher before the delta variant (87.8% vs. 84.06%, $p = 0.016$). The hospitalization rate was higher before the delta variant ($p < 0.001$), whereas PICU admission showed no statistical difference.

**Conclusions:** The frequency of school-aged children and adolescents raised with the impact of both school openings and the delta variant, and the rate of pediatric cases increased in total COVID-19 patient numbers.

**KEYWORDS:** SARS-CoV-2, delta variant, pediatric patients, epidemiology

## BACKGROUND

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first appeared in Wuhan, China, then spread worldwide, resulting in many people being infected or dead [1, 2]. The first case in Turkey was diagnosed on 11 March 2020. Fewer cases were reported in children than adults, and were milder or asymptomatic [3]. However, some infected children and adolescents had severe

symptoms or pneumonia that required hospitalization or intensive care [4]. The most common symptoms have been fever, cough, sore throat, runny nose and vomiting in pediatric patients [3, 5].

The delta variant (B.1.617.2), which emerged as a result of the mutation in the spike protein of SARS-CoV-2, first appeared in India in October 2020 and was defined as Variant of Concern (VOC) in May 2021 [6, 7]. It is more infectious than the original strain of SARS-CoV-2, and case numbers increased with the dominance of the delta variant [1, 8]. The delta variant leads to higher viral loads, causing infection in both vaccinated and unvaccinated individuals [8].

Earlier in the pandemic, coronavirus disease 2019 (COVID-19) seemed to affect older and male patients. However, it was later understood that SARS-CoV-2 could affect all age groups, but clinical severity depends on advancing age [9, 10]. Children and adolescents, who are asymptomatic or have mild symptoms indistinguishable from other common upper respiratory tract infections, can transmit the virus to elderly patients [11]. However, studies in the early stages of the pandemic have shown that children play a minor role in transmitting the virus [11, 12]. Several measures have been taken to reduce the spread of the disease in many countries; one of the most consistently applied is school closures [13]. After loosening the restrictions in Turkey, schools were opened gradually on 6 September 2021, and vaccination for children and adolescents (under age 18) was initiated by August 2021.

This study aimed to investigate all SARS-CoV-2 polymerase chain reaction (PCR) positive pediatric outpatients and inpatients' clinical features, hospitalization rates and risk factors, and the impact of delta variant on case numbers and disease severity. This study also aims to put forth case numbers longitudinally along with the pandemic and relationships with restrictions and school closures.

## MATERIAL AND METHODS

### Study design and study population

Ege University Children's Hospital is a tertiary care institution in Izmir, Turkey. A retrospective observational study was performed between March 2020 and December 2021. All pediatric outpatients and inpatients aged between 0 and 18 years with a SARS-CoV-2 PCR positive result were included. The patients were identified retrospectively through medical records. A standardized form was used to collect epidemiologic data, including demographic characteristics, underlying medical conditions and prognosis. Telephone interviews could be performed with a subset of the patients after obtaining The Free, Prior, and Informed Consent to collect incomplete medical data. We evaluated patients' symptoms, hospitalization rates, risk factors and treatment protocols. We compared patients' demographics before and after the delta variant became dominant. The delta variant could be detected by PCR after 13 August 2021, in our hospital. The first group included patients between March 2020 and 13 August 2021, and identified as before delta (BD) group. The second group was identified as the after delta (AD) group, which included patients between 13 August and 31 December 2021. The patients and their parents were also asked for contact with a COVID-19 patient (sick contact) in the household and/or school. The vaccination status of parents and patients was noted. Pediatric and adult case numbers daily and monthly were collected from Ege University Public Health Department data. The rate of pediatric cases to all cases monthly was calculated, and the number of inpatients, PICU admitted patients and MIS-C were recorded from electronic files.

### Microbiologic methods

Combined nasopharyngeal and oropharyngeal swab specimens were collected in a viral transport medium, including VNat (Bioeksen, Turkey). All samples were tested in our Molecular Virology Laboratory by using the Bio-speedy® SARS-CoV-2 Double Gene Real-Time Quantitative Reverse Transcription PCR (Bioeksen, Turkey). This assay amplifies and detects two targets (ORF1ab and N) of the virus with a limit of detection of 200 genomes per ml. The human gene target RNAse P (RP) was measured in each sample for use in internal control. Reverse transcription-polymerase chain reaction (RT-PCR) was performed using the Rotor-Gene (Qiagen, Luxemburg). Results were considered positive if the signal was detected ($Ct < 35$) for RP, ORF1ab and N genes.

### Definitions

Symptomatic patients were defined with at least one specific symptom. Underlying diseases included asthma-allergy, chronic neurologic and neuromuscular disorders, congenital heart diseases, endocrinologic diseases, primary immune deficiencies, rheumatic diseases, genetic syndromes, solid and hematologic malignancies, hematologic disorders, renal diseases, chronic pulmonary diseases, obesity, metabolic diseases, gastrointestinal system disorders, solid organ and hematopoietic stem cell transplantation, hypertension, etc. were recorded. Steroid treatment was defined who received either dexamethasone or methylprednisolone. Oxygen demand was determined in patients who required one of the followings: Non-invasive supplies [high flow nasal cannula

(HFNC), continuous positive airway pressure (CPAP), bilevel positive airway pressure (BPAP)], oxygen therapy with a mask or nasal cannula.

### Statistical analysis

Statistical analysis was performed with SPSS statistical package (version 25 for Windows). Numerical data were presented for continuous variables as either mean or median, depending on the distributional nature of the data. Mann–Whitney U and Wilcoxon tests were used for intervariable analysis. Categorical variables were evaluated with the Chi-square test or the two-tailed Fisher exact test and presented as percentages. Odds ratio (OR) and 95% confidence intervals (CIs) were calculated by using the Chi-square test.

### Ethics

Ethical Board of Ege University and the Republic of Turkey Ministry of Health approved the study (ethical decision No: 21-12 T/15).

## RESULTS

### Demographic and clinical data

We identified 3175 patients with positive SARS-CoV-2 PCR results during the study period. The mean age of the patients was 10.61 ± 4.6 years, and 50.2% were male. Of the interviewed patients, 85.7% reported at least one symptom, while the remaining 14.3% were asymptomatic. The most common symptoms were fever (52.3%), cough (30.3%) and sore throat (13.9%). The hospitalization rate was 5.6%, and PICU admission was 0.8%. Pneumonia was diagnosed in 28.8% of hospitalized patients, and 18.8% required oxygen therapy (Table 1). There was an underlying condition in 283 patients (8.9%). The most common underlying disease was asthma-allergy (1.6%), followed by chronic neurological/neuromuscular disorder (1%) and congenital heart disease (0.6%) (Table 2). Of the hospitalized patients, 54.4% had at least one underlying disease. The most common underlying condition in hospitalized patients was chronic neurological/neuromuscular disorder (8.3%), followed by obesity (5%). Among hospitalized patients with obesity, seven (77.7%) were admitted to PICU, and three (33.3%) underwent mechanical ventilation (Table 2).

**Table 1.** The demographic and clinical characteristics of the study population

| Characteristics | *n* (%) |
|---|---|
| Age (mean ± SD, years) | 10.61 ± 4.6 |
| Age groups | |
| 0–4 years | 415 (13.1) |
| 5–9 years | 664 (20.9) |
| 10–14 years | 1404 (44.2) |
| 15–18 years | 692 (21.8) |
| Male | 1593 (50.2) |
| Underlying conditions (*n*, %) | 283 (8.9) |
| Symptoms[a] | 1556 (85.7) |
| Fever | 951 (52.3) |
| Duration of fever (mean ± SD, days) | 1.85 ± 1.09 |
| Cough | 551 (30.3) |
| Sore throat | 255 (13.9) |
| Arthralgia-Myalgia | 231 (12.7) |
| Runny nose | 178 (9.8) |
| Headache | 135 (7.4) |
| Loss of taste and smell | 119 (6.5) |
| Diarrhea | 103 (5.6) |
| Fatigue | 92 (5) |
| Abdominal pain | 56 (3) |
| Shortness of breath | 44 (2.4) |
| Asymptomatic | 259 (14.3) |
| Hospitalization | 180 (5.6) |
| COVID-19-related cause | 153 (85) |
| Underlying conditions | 98 (54.4) |
| Pneumonia | 52 (28.8) |
| Oxygen demand | 34 (18.8) |
| Steroid use | 29 (16.1) |
| PICU admission | 28 (0.8) |
| COVID-19 related cause | 22 (78.5) |
| Underlying conditions | 17 (60.7) |
| Mechanical ventilation | 15 (53.5) |

COVID-19, coronavirus disease 2019; SD, standard deviation; PICU, pediatric intensive care unit.
[a] Symptoms were interviewed in 1815 patients.

### Case distribution and rates

We determined daily case numbers and their relation to restrictions applied in our country. Figure 1 shows daily pediatric case numbers in our hospital since the pandemic's beginning. There were four waves of COVID-19, which led to a rise in the case numbers. Schools re-opened permanently on 6 September after the decline in the case numbers in the summer of 2021. After the delta variant became dominant, school openings led to increased case numbers. Figure 2 shows the monthly ratio of pediatric cases to all positive SARS-CoV-2 PCR cases (adult and pediatric patients) detected in our center. The rate of pediatric cases to all COVID-19 cases has been stable since August 2021; then, an increase was observed in the pediatric cases and reached 35.8% on October 2021. Meanwhile, with widespread vaccination among pediatric patients above 12 years of age, it declined to 20.4% on November 2021. Figure 3 shows hospitalization rates, PICU admission, and MIS-C cases in our clinic and their relation to case numbers monthly from the pandemic's beginning.

**Table 2.** The underlying conditions of the hospitalized, pediatric intensive care unit (PICU) admitted and all patients

| Underlying condition, *n* (%) | Hospitalized | PICU admitted | All patients |
|---|---|---|---|
| Asthma-allergy | 4 (2.2) | | 53 (1.6) |
| Chronic neurologic-neuromuscular disorder | 15 (8.3) | 1 (3.5) | 34 (1) |
| Congenital heart disease | 6 (3.3) | 1 (3.5) | 20 (0.6) |
| Endocrinologic disease | 7 (3.8) | 2 (7.1) | 18 (0.5) |
| Primary immune deficiency | 7 (3.8) | 1 (3.5) | 16 (0.5) |
| Rheumatic diseases | 1 (0.5) | | 15 (0.4) |
| Genetic syndromes | 7 (3.8) | 1 (3.5) | 13 (0.4) |
| Solid malignancy | 6 (3.3) | | 13 (0.4) |
| Hematologic disorder | 2 (1.1) | | 12 (0.3) |
| Nephrologic disease | 3 (1.6) | 1 (3.5) | 12 (0.3) |
| Hematologic malignancy | 5 (2.7) | | 11 (0.3) |
| Obesity | 9 (5) | 7 (25) | 10 (0.3) |
| Chronic pulmonary disease | 6 (3.3) | 1 (3.5) | 10 (0.3) |
| Metabolic disease | 7 (3.8) | 1 (3.5) | 10 (0.3) |
| Gastrointestinal system disorders | 5 (2.7) | | 8 (0.2) |
| Solid organ transplantation | 5 (2.7) | 1 (3.5) | 8 (0.2) |
| Hematopoietic stem cell transplantation | 1 (0.5) | | 5 (0.1) |
| Hypertension | 1 (0.5) | | 5 (0.1) |
| Other | 1 (0.5) | | 10 (0.3) |

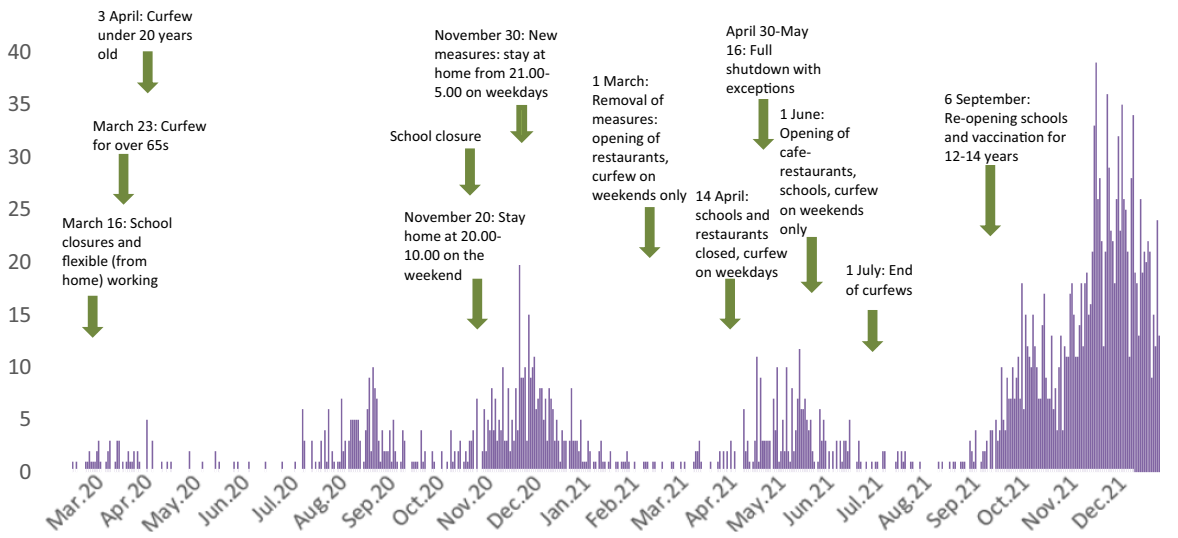


**Figure 1.** SARS-CoV-2 PCR (+) pediatric patients' numbers and restrictions in Turkey.

### Delta variant impact

Total cases were divided into two groups; BD and AD determine the impact of the delta variant. The BD group included 953 patients between March 2020 and 13 August 2021; the second group with the AD group included 2222 patients between 13 August and 31 December 2021. There was no statistical difference in the mean age of the patients (9.98 vs. 10.88, $p = 0.11$). Male patients and underlying conditions were significantly more common in the BD group ($p = 0.02$ and $<0.001$). Age groups were significantly different ($p = 0.006$) between the groups; 0–4 years were more frequent in the BD group (24.2% vs. 8.2%). School-aged children and adolescents (5–9 years and 10–14 years) were more frequent in the AD group than in the BD group (17.4% vs. 22.4% and 29.3% vs. 50.5%). The hospitalization rate was significantly higher in the BD group (12.8% vs. 2.61%, $p < 0.001$); however,

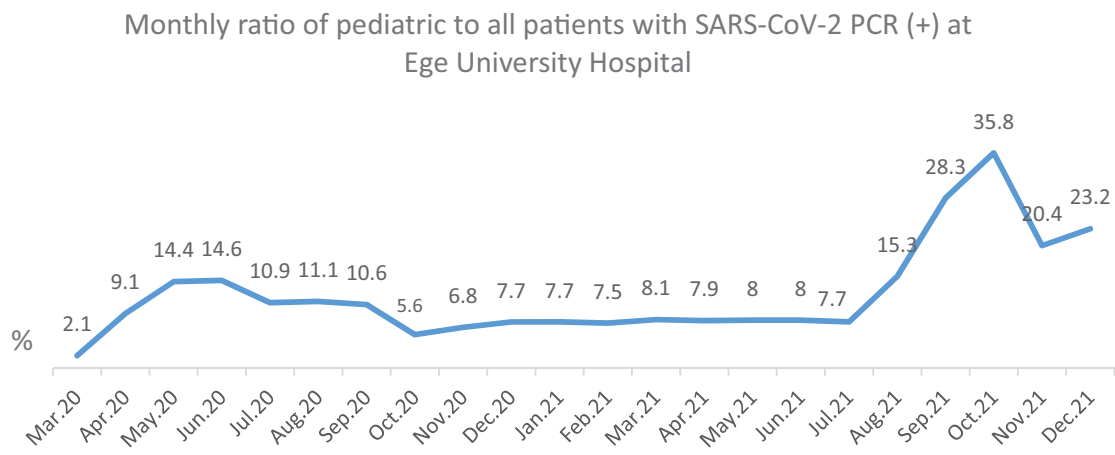


**Figure 2.** Monthly ratio of pediatric to all patients with SARS-CoV-2 PCR (+) at Ege University Hospital.

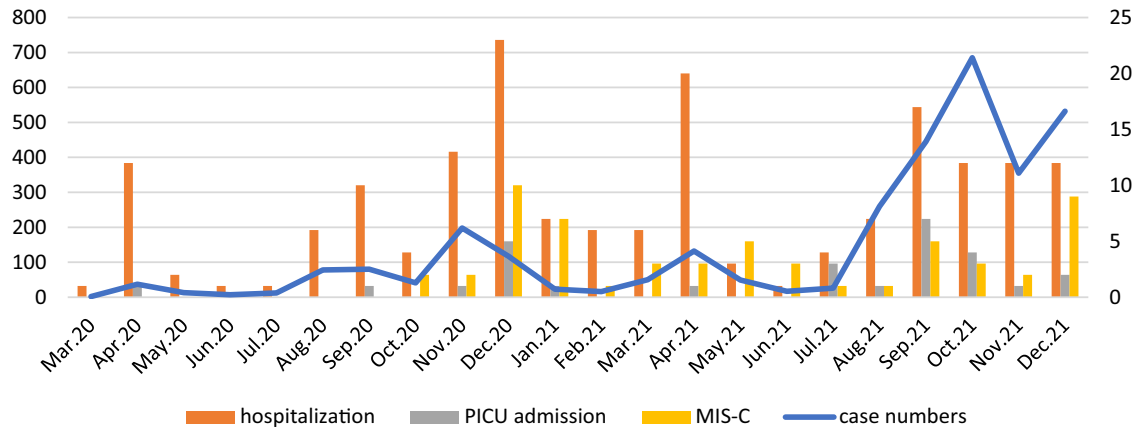


**Figure 3.** Relation between case numbers and hospitalization.

PICU admission was higher in the AD group, without a significant difference (10.6% vs. 25.8%, $p = 0.07$). There were no statistical differences between the groups for underlying disease in hospitalized patients, COVID-related hospitalization or pneumonia ($p$ values were 0.25, 0.75 and 0.13, respectively). Oxygen demand and steroid use were significantly higher in the AD group than BD ($p$ values: 0.004 and <0.001). The length of hospitalization was not significantly different among BD and AD groups ($p = 0.44$). Symptomatic cases were significantly higher in the BD group (87.8% vs. 84.06%, $p = 0.01$). There were no significant differences in cough, sore throat, shortness of breath, headache, loss of taste and smell, and fatigue ($p$ values were 0.36, 0.48, 0.14, 0.75, 0.70 and 0.63, respectively). Runny nose was significantly higher in the AD group ($p = 0.001$), while fever, abdominal pain, diarrhea and arthralgia-myalgia were higher in the BD group ($p = 0.03$, 0.01, <0.001, <0.001, respectively). Characteristics of pediatric patients in BD and AD groups are shown in Table 3.

### Transmission and vaccination status

The transmission of COVID-19 was interviewed after re-opening schools on 6 September 2021, and 695 pediatric patients had contact with SARS-CoV-2-infected persons. Among these patients, 337(48.4%) had household contact, 255 (36.6%) had sick contact in school and 103(14.8%) had both.

Vaccination status data were collected from 685 fathers, 730 mothers and 499 patients. The vaccination rate with the BNT162b2 mRNA COVID-19 among fathers was 75.3% and inactivated COVID-19 vaccine

**Table 3.** Characteristics of pediatric patients before and after delta variant

| | Before delta-953 patients | After delta-2222 patients | *p*-value | Odds ratio (95% confidence interval) |
|---|---|---|---|---|
| Age (mean ± SD, years) | 9.98 ± 5.6 | 10.88 ± 4.0 | 0.11 | |
| Age groups | | | | |
| 0–4 years | 231 (24.2) | 184 (8.2) | **0.006** | |
| 5–9 years | 166 (17.4) | 498 (22.4) | | |
| 10–14 years | 280 (29.3) | 1124 (50.5) | | |
| 15–18 years | 276 (28.9) | 416 (18.7) | | |
| Male, *n* (%) | 508 (53.3) | 1085 (48.8) | **0.02** | 0.83(0.71–0.97) |
| Underlying conditions, *n* (%) | 199 (20.8) | 84 (3.78) | **<0.001** | 0.146 (0.11–0.19) |
| Hospitalized cases, *n* (%) | 122 (12.8) | 58 (2.61) | **<0.001** | 0.185(0.13–0.25) |
| Underlying disease[a] | 68 (55.7) | 30 (51.7) | 0.25 | |
| COVID-related cause[a] | 103 (84.4) | 50 (86.2) | 0.75 | |
| Pneumonia[a] | 31 (25.4) | 21 (36.2) | 0.13 | |
| Oxygen demand[a] | 16 (13.1) | 18 (31) | **0.004** | 2.98(1.38–6.40) |
| Steroid use[a] | 8 (6.5) | 21 (36.2) | **<0.001** | 8.08(3.30–19.78) |
| Mechanical ventilation[a] | 7 (5.7) | 8 (13.7) | 0.06 | |
| Length of stay (mean ± SD, days)[a] | 9.7 ± 19.0 | 9.58 ± 9.84 | 0.44 | |
| PICU admissions[a] | 13 (10.6) | 15 (25.8) | 0.07 | |
| Symptoms[b] | 696 (87.8) | 860 (84.06) | **0.01** | 0.71(0.54–0.94) |
| Fever | 438 (55.3) | 513 (50.1) | **0.03** | 0.81(0.67–0.98) |
| Cough | 232 (29.2) | 319 (31.1) | 0.36 | |
| Sore throat | 116 (14.6) | 137 (13.3) | 0.48 | |
| Arthralgia- Myalgia | 152 (19.1) | 79 (7.7) | **<0.001** | 0.35 (0.26–0.47) |
| Runny nose | 57 (7.1) | 121 (11.8) | **0.001** | 1.74 (1.25–2.42) |
| Headache | 58 (7.3) | 77 (7.5) | 0.75 | |
| Diarrhea | 71 (8.9) | 32 (3.1) | **<0.001** | 0.34(0.22–0.52) |
| Loss of taste and smell | 50 (6.3) | 69 (6.7) | 0.70 | |
| Fatigue | 38 (4.7) | 54 (5.2) | 0.63 | |
| Abdominal pain | 34 (4.2) | 22 (2.1) | **0.01** | 0.49 (0.28–0.85) |
| Shortness of breath | 24 (3.03) | 20 (1.9) | 0.14 | |
| Fever duration (mean ± SD, days) | 1.78 ± 1.10 | 1.90 ± 1.08 | 0.14 | |
| Asymptomatic | 96 (12.1) | 163 (15.9) | | |

All analyzes were determined by the Chi-square test. The bold values indicate statistical analysis differences, and correlations were considered significant at $p < 0.05$. COVID-19, coronavirus disease 2019; SD, standard deviation; PICU, pediatric intensive care unit.

[a] In hospitalized.

[b] Symptoms were interviewed in 792 cases before delta and 1023 cases after the delta group.

was 11.8. Thirty (4.3%) were vaccinated with both, while 56 (8.1%) fathers were not vaccinated. Mothers were commonly vaccinated with the BNT162b2 mRNA COVID-19 vaccine [531 (72.7%)], followed by inactivated COVID-19 vaccine [98 (13%)]. Forty (5.4%) mothers were vaccinated with both, while 61(8.3%) were not vaccinated.

A total of 424 patients were commonly unvaccinated (84.9%), 60 (12%) were vaccinated with the BNT162b2 mRNA COVID-19 vaccine and 15 (3%) with inactivated COVID-19 vaccine.

## DISCUSSION

Four waves of the COVID-19 pandemic led case numbers to rise in Ege University Children's Hospital parallel to Turkey and world data [14, 15]. This study comprehensively investigates the number and characteristics of pediatric cases since the pandemic's beginning and compares the pre-delta and post-delta periods in a university hospital. We showed a significant rise in hospital admissions during the delta variant period. Meanwhile, the hospitalization rate decreased by 5-fold, whereas PICU admission increased by 2.5-fold. The most common transmission route was household contact; however, there was a considerable rate of school transmission. As a result, school-aged children and adolescents (5–14 years) were more commonly infected, while 0–4 years were less commonly infected after the delta variant became dominant. Pediatric patients with neuromuscular diseases were more likely to be hospitalized, while obesity was the most common underlying condition in PICU admitted patients and patients requiring respiratory support.

Four waves occurred; restrictions and school closures began when case numbers rose. Turkey implemented restrictions to control transmission in public; from the beginning of the pandemic, schools were closed immediately, and an online education program was started and continued for nearly one year. First, healthcare professionals were vaccinated due to limited available vaccines, and subsequently, people with comorbidities were vaccinated in January 2021. Children were not vaccinated before September, and the rate of adults vaccinated with at least two doses increased over time. This difference in the time of vaccination programs of adults and pediatric patients may explain this relative increase of pediatric cases among all cases. Other possible explanations would be delta variant impact and school re-openings. Children and adolescents' isolation plays an essential role in controlling the pandemic due to the transmission risk to adults, like other respiratory tract viruses [16]. In the early phase of the pandemic, Auger, *et al.* [17] reported school closure was associated with a significant decline in the incidence (−62%) and mortality (−58%) of COVID-19. Valentine, *et al.* [18] reported an increase in COVID-19 case numbers after school re-openings in the United States in the Fall of 2021.

Viner, *et al.* [12] demonstrated that secondary attack rates were significantly lower in schools than in households, suggesting that household transmission is more important than school transmission. Studies showed negative impacts on children's well-being, learning opportunities, and emotional stress caused by school closures [19, 20]. School closures can reduce viral transmission; however, it should be considered a last resort in case non-pharmaceutical interventions and vaccination are insufficient [19].

Several studies suggest that pediatric patients were less frequently infected with SARS-CoV-2, displayed milder symptoms, and less frequently required hospital admission and PICU admission [3, 21]. The expression of the primary target receptor for SARS-CoV-2, ACE-2, increases with age, leading to decreased angiotensin-2-mediated pulmonary capillary leak and inflammation and a better prognosis of COVID-19 in children [22]. Viral ribonucleic acid (RNA) shedding time is significantly shorter in children than in adults, leading to asymptomatic infections or milder symptoms [23]. However, viable virus shedding was determined in a child for 54 days [24]. Taylor, *et al.* [25] reported in adults that hospitalization rates were 24.7% in the pre-delta period and 35.8% during the delta period. Our study group's hospitalization rate was 5.6%, remarkably lower than adult data. A meta-analysis evaluated children's demographic characteristics and identified fever and cough as the most common symptoms in pediatric patients, similar to our results [26]. In contrast, Molteni, *et al.* [27] reported that headache and fatigue were the most frequent.

The most common underlying disease in our study group was asthma-allergy, but it was less common in hospitalized patients. Similarly, previous studies also demonstrated asthma-allergy was not a risk factor for severe disease [28, 29]. In our study, the most common disease was chronic neuromuscular disorders among hospitalized pediatric patients. Chronic neurological/neuromuscular disorders have been assumed to be vulnerable to more severe infection and at risk for severe illness due to decreased respiratory capacity [30]. However, Natera-de Benito, *et al.* [31] showed underlying neuromuscular diseases did not alter disease severity in COVID-19 pediatric patients. The pneumonia incidence was %20 in chronic neuromuscular disease patients, while only one patient was admitted to PICU in our study.

Studies among the pediatric population reported obesity as one of the most common comorbidity in hospitalized patients [32, 33]. In our study, obesity was the second most common underlying disease in hospitalized patients (5%), and the most common in PICU admitted patients (25%). All obese patients required oxygen and steroid therapy; three underwent mechanical ventilation. Zachariah, *et al.* [34] reported a significant association between obesity and mechanical ventilation in pediatric patients. Pediatricians should also be aware of the increased risk of severe COVID-19 in obese patients.

The B.1.617.2 (delta) variant, which became the dominant strain in many countries after the summer months of 2021, took the place of prior variants [35]. Delta variant is sixfold less sensitive to serum neutralizing antibodies and eightfold less sensitive to vaccine-elicited antibodies compared with wild-type virus [36]. The more contagious delta variant increased case numbers and hospitalization rates with higher replication and immune escape activity [1]. After the delta virus became dominant in the United States, hospitalizations in children and adolescents increased fivefold [37]. In addition, an increase in intensive care unit admissions was observed [38]. Ryu, *et al.* [39] found no difference in hospitalization, PICU admission, pneumonia or oxygen demand between delta minor and dominant groups in previously healthy pediatric patients. We showed the hospitalization rate was lower in the delta dominant period, whereas the rate of PICU admission was higher. Pneumonia, oxygen demand and steroid use in hospitalized patients were higher after the delta variant became dominant. In a study conducted in the United States during the

summer of 2021, during delta variant dominance, approximately three-quarters (77.9%) of pediatric patients were hospitalized for acute COVID-19, and among hospitalized pediatric patients, 54% needed oxygen therapy, 29.5% were admitted to PICU and 14.5% required invasive mechanical ventilation, considerably higher than our study [33]. In that study, 67.5% of hospitalized cases had one underlying condition; similarly, we found that majority of hospitalized patients (51.7%) had at least one condition after the delta variant [33]. Despite the rise in the case numbers, only children and adolescents with underlying conditions and severe symptoms were more likely to be hospitalized after the delta variant in our hospital.

The most common symptom was fever and cough in both BD and AD groups, while asymptomatic cases were higher in the AD group. Similarly, Ryu, *et al.* [39] also reported higher rates of asymptomatic cases during the delta dominant period. We found runny nose was more frequently reported in the AD group as Molteni, *et al.* [40] reported, whereas Ryu, *et al.* [39] stated less frequently after the delta dominant period.

### Limitations

The first limitation of our study is its retrospective nature. Second, it is a single-center study. Thirdly, we determined after and before delta groups by date, but we could not assess all PCR samples in terms of variants.

## CONCLUSION

In conclusion, the delta variant overlapping school openings in Turkey led to increased case numbers, and the rate of pediatric cases in all age groups rose critically. During the delta variant period, the total number of hospital admissions increased, whereas the rate of symptomatic cases decreased. Children below four years old were less frequently infected, while the school-aged group was more commonly infected. Despite the lower hospitalization rate after the delta variant, we demonstrated a higher rate of PICU admission. Pediatricians should be aware of the increased risk of hospitalization in patients with neurological/neuromuscular disorders and the significant association between obesity and PICU admission. Risk factors and epidemiological features may be altered with new variants of SARS-CoV-2.

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