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Features of COVID-19 Among Children and Adolescents Without Risk Factors Before and After the Delta Variant Outbreak in South Korea

To the Editors:

As the Delta variant of coronavirus disease 2019 (COVID-19) pandemic spreads, the number of children and adolescents infected with this lineage is increasing. However, the relationship between

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Address for Correspondence: Oh-Hyun Cho, MD, PhD, Department of Internal Medicine, Gyeongsang National University Changwon Hospital, Gyeongsang National University College of Medicine, 11 Samjeongja-ro, Seongsan-gu, Changwon, Gyeongsangnam-do 51472, South Korea. E-mail: zenmd@naver.com

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TABLE 1. Characteristics and Outcome of Children and Adolescents COVID-19 Patients in the Residential Treatment Centers

Characteristic and outcome	Delta-minor (n = 92)	Delta-dominant (n = 143)	P value
Age (mean ± SD, years)	13.8 ± 3.3	10.2 ± 4.4	<0.001
Children (<10 years of age)	13 (14.1)	66 (46.2)	<0.001
Male	56 (60.9)	75 (52.4)	0.21
Underlying disease	0	0	NA
Period from diagnosis to RTC enter date (mean ± SD, days)	0.7 ± 1.1	1.6 ± 1.4	<0.001
Symptom during isolation			
Fever	5 (5.4)	7 (4.9)	>0.99
Duration of fever (mean ± SD, days)	1.4 ± 0.9	1.7 ± 1.9	0.74
Chill	4 (4.3)	2 (1.4)	0.21
Myalgia	7 (7.6)	3 (2.1)	0.051
Fatigue	3 (3.3)	2 (1.4)	0.38
Anorexia	5 (5.4)	3 (2.1)	0.27
Cough	26 (28.3)	52 (36.4)	0.21
Sputum	24 (26.1)	27 (18.9)	0.2
Shortness of breath	0	1 (0.7)	>0.99
Rhinorrhea	23 (25)	15 (10.5)	0.003
Nasal stuffiness	32 (34.8)	22 (15.4)	0.001
Sore throat	22 (23.9)	18 (12.6)	0.02
Chest pain	1 (1.1)	0	0.39
Nausea/vomiting	4 (4.3)	4 (2.8)	0.72
Diarrhea	7 (7.6)	8 (5.6)	0.54
Abdominal pain	2 (2.2)	3 (2.1)	>0.99
Headache	10 (10.9)	20 (14)	0.49
Parosmia	8 (8.7)	14 (9.8)	0.78
Parageusia	9 (9.8)	12 (8.4)	0.72
Asymptomatic during isolation	27 (29.3)	62 (43.4)	0.03
Pneumonia during isolation	2 (2.2)	1 (0.7)	0.56
Length of isolation (mean ± SD, days)	9.3 ± 2.0	8.4 ± 1.9	0.001
Transfer to hospital	5 (5.4)	3 (2.1)	0.27
COVID-19 related cause	1 (1.1)	0	0.39
Non-COVID-19 related cause	4 (4.3)	3 (2.1)	0.44
Oxygen supply	0	0	NA
ICU admission	0	0	NA
Length of hospital stay (mean ± SD, days)	10.8 ± 10.2	8.7 ± 8.1	0.77

SD, standard deviation; NA, not available; RTC, residential treatment center; ICU, intensive care unit. Data are number (%) of patients, unless otherwise indicated.

the prognosis of pediatric patients and the Delta variant has not been fully elucidated. In this regard, two studies using the national big data reported a similar incidence of intensive care unit (ICU) admission and mechanical ventilation in the age group of 0–17 years before and after the Delta variant outbreak in the USA.^{1,2} However, additional data reflecting various races and regions are still needed. In South Korea, mild-to-moderate COVID-19 patients without risk factors are isolated in residential treatment centers (RTCs). We retrospectively compared the clinical features of unvaccinated children and adolescents admitted to RTCs before and after the Delta variant outbreak in South Korea.

We collected demographics, COVID-19 symptoms, chest radiograph findings and hospital transfer of patients <18 years of age who were admitted to two RTCs in Gyeongsangnam-do, South Korea from December 2020 to August 2021. Based on the nationwide surveillance data of SARS-CoV-2 variants, we divided the

patients into the following two groups: (1) the Delta-minor group (diagnosed from December 2020 to June 2021, detection rate <10%) and (2) the Delta-dominant group (diagnosed during August 2021, detection rate >90%). Patients diagnosed during July 2021 were excluded because of inconclusive detection rates of the Delta variant (53.7%). The collected medical information was compared between the two groups. This study was approved by the Institutional Review Board of Gyeongsang National University Changwon Hospital (No.2021-09-023). Descriptive/inferential statistics and regression analysis were used.

Among the 235 patients, 92 (39.1%) were in the Delta-minor group and 143 (60.9%) were in the Delta-dominant group. The Delta-dominant group patients were younger (mean age 13.8 vs. 10.2 years, $P < 0.001$). Neither group had any underlying diseases considered as risk factors for severe COVID-19, such as hypertension or diabetes. There was no significant difference between the two groups

TABLE 2. Analysis of Factors Affecting Asymptomatic COVID-19 and All-Cause Hospital Transfer of Children and Adolescents COVID-19 Patients

	Variable	Univariate Analysis OR (95% CI)	P value	Multivariate Analysis aOR (95% CI)	P value
Asymptomatic COVID-19	Children (<10 years of age)	4.78 (2.65–8.45)	<0.001	4.77 (2.65–8.46)	<0.001
	Male	1.11 (0.65–1.88)	0.71	-	-
	Delta-dominant group	1.84 (1.06–3.22)	0.03	-	-
All-cause transfer to hospital	Children (<10 years of age)	1.19 (0.28–5.12)	>0.99	-	-
	Male	2.45 (0.48–12.39)	0.31	-	-
	Delta-dominant group	0.37 (0.09–1.60)	0.27	-	-

aOR, adjusted odds ratio; OR, odds ratio.

in COVID-19 symptoms, except for the lower frequencies of rhinorrhea (25% vs. 10.5%, $P = 0.003$), nasal stuffiness (34.8% vs. 15.4%, $P = 0.001$) and sore throat (23.9% vs. 12.6%, $P = 0.02$) in the Delta-dominant group compared with those in the Delta-minor group. Additionally, more patients in the Delta-dominant group were asymptomatic compared with those in the Delta-minor group (29.3% vs. 43.4%, $P = 0.03$). There was no statistically significant difference between the two groups in the frequency of pneumonia (2.2% vs. 0.7%, $P = 0.56$) and hospital transfer (5.4% vs. 2.1%, $P = 0.27$). For in-hospital outcomes, the increased oxygen demand, ICU admission and death were not observed (Table 1). In the multivariate analysis, children <10 years of age were related with asymptomatic COVID-19 (adjusted odds ratio 4.77). The Delta-dominant group was not associated with asymptomatic COVID-19 or transfer to hospital (Table 2).

The Delta variant infection does not appear to cause worse clinical outcomes than prior lineages do in unvaccinated children and adolescents without risk factors, unlike adult COVID-19 patients.³ Immune

system differences from adults and good health status without underlying diseases may have contributed to the favorable prognosis of patients in our study.^{4,5} The lack of whole-genome sequencing, the small number of patients and study sites are limitations of our study.

Byung-Han Ryu, MD, MS,*

Sun In Hong, MD, MS,*

Su Jin Lim, MD, MS,†

Younghwa Cho, MD,‡

Kyung-Wook Hong, MD, PhD,§

In-Gyu Bae, MD, PhD,§,¶

and Oh-Hyun Cho, MD, PhD*,§,¶

From the *Department of Internal Medicine, Gyeongsang National University Changwon

Hospital, Changwon, †Department

of Internal Medicine, Gyeongsangnam-do

Masan Medical Center, Changwon, ‡Depart-

ment of Internal Medicine, Korea Labour

Welfare Corporation Changwon Hospital,

Changwon,

§Department of Internal Medicine,

Gyeongsang

National University Hospital, Gyeongsang

National University College of Medicine,

Jinju, and ¶Gyeongsang Institute of Health

Sciences, Gyeongsang National University College of Medicine, Jinju, South Korea.

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