

Brief Communication
Pediatrics



Impact of Social Distancing on Intussusception Incidence in Children

Young June Choe ^{1,2}, Yoon Lee ^{1,2} and Jung Ok Shim ^{2,3}

¹Department of Pediatrics, Korea University Anam Hospital, Seoul, Korea

²Korea University College of Medicine, Seoul, Korea

³Department of Pediatrics, Korea University Guro Hospital, Seoul, Korea



Received: Sep 25, 2021

Accepted: Dec 19, 2021

Published online: Dec 29, 2021

Address for Correspondence:

Jung Ok Shim, MD

Department of Pediatrics, Korea University Guro Hospital, 148 Gurodong-ro, Guro-gu, Seoul 08308, Korea.


Email: shimjo@korea.ac.kr

© 2022 The Korean Academy of Medical Sciences.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Young June Choe 
<https://orcid.org/0000-0003-2733-0715>

Yoon Lee 
<https://orcid.org/0000-0001-9521-3575>

Jung Ok Shim 
<https://orcid.org/0000-0001-6449-7819>

Disclosure

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Choe YJ, Shim JO. Data curation: Choe YJ. Formal analysis: Choe YJ, Lee Y. Investigation: Choe YJ, Shim JO. Supervision: Shim JO. Validation: Lee Y, Shim JO. Writing - original draft: Choe YJ. Writing - review & editing: Choe YJ, Shim JO.

ABSTRACT

Following nonpharmaceutical intervention (NPI) to mitigate coronavirus disease 2019 has led to drastic reduction in incidence of communicable disease. Intussusception is commonly preceded by infectious pathogens. Indirect effect from NPI implementation on incidence of intussusception has not been understood fully. We conducted a cohort study to estimate the impact of NPI on incidence of intussusception in Korean children. The net risk ratio of intussusception incidence for 2020 compared to 2010–2019 was 0.53 (95% confidence interval [CI], 0.43–0.64) for boys and 0.56 (95% CI, 0.44–0.71) for girls (*P* for difference = 0.017). Our study showed an association between NPI implementation and reduction of intussusception incidence, with more profound reduction in boys compared to girls.

Keywords: Intussusception; Social Distancing; Non-pharmaceutical Intervention; COVID-19; Coronavirus

Intussusception is an invagination of the intestine and is the leading cause of intestinal obstruction in infants, mostly with male predominance. The etiology of intussusception is unclear but epidemiological studies implicate an infectious pathogen, which cause disease in predisposed infants.¹

In 2020, nonpharmaceutical interventions (NPI) to stop transmission of coronavirus disease 2019 (COVID-19) has shown not only to mitigate the COVID-19 spread, but also have decreased the burden of other communicable diseases. In this study we link the effect of NPI on incidence of intussusception and suggest the role for communicable pathogens in pathophysiology of the disease.

We accessed to Healthcare Bigdata Hub, from the single-payer health insurance system in South Korea. We included all children aged < 5 years coded with intussusception (ICD-10 CM; K561) and a procedure code for reduction or surgical intervention from 2010 to 2020. We included only the first examination result of each patient. Descriptive statistics with monthly incidence rates per 100,000 (denominator from Census) was calculated for boys and girls. Monthly intussusception incidence rate ratio (IRR) was calculated for 2020 vs. 2010–2019. To examine the net risk ratio of intussusception incidence, we used Poisson regression model using R (ver. 3.6.2).

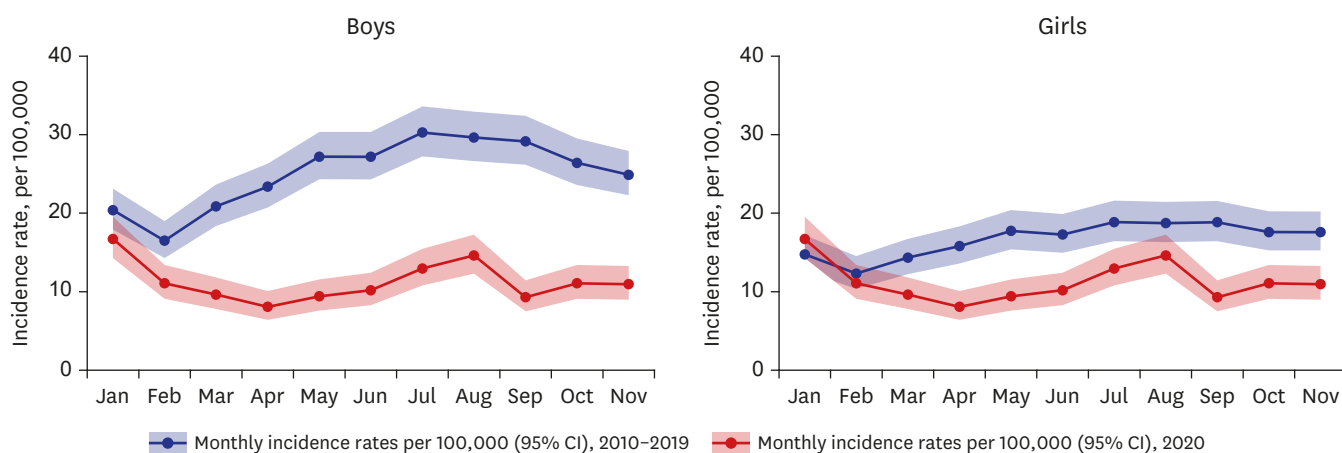


Fig. 1. Monthly incidence rates of intussusception in children aged < 5 years by sex, 2020 vs. 2010–2019, South Korea. CI = confidence interval.

Table 1. Monthly IRR for 2020 vs. 2010–2019 on diagnoses of intussusception in children aged < 5 years by sex, South Korea

Month	Boys			Girls		
	IRR	95% CI	P value	IRR	95% CI	P value
Jan	0.82	(0.41–1.70)	0.627	1.17	(0.53–2.43)	0.728
Feb	0.67	(0.27–1.46)	0.265	0.67	(0.23–1.77)	0.383
Mar	0.46	(0.20–1.05)	0.050	0.45	(0.13–1.18)	0.078
Apr	0.35	(0.13–0.80)	0.007	0.41	(0.12–1.00)	0.035
May	0.35	(0.13–0.73)	0.003	0.35	(0.10–0.87)	0.015
Jun	0.37	(0.16–0.78)	0.005	0.45	(0.17–1.15)	0.076
Jul	0.43	(0.20–0.85)	0.010	0.46	(0.18–1.09)	0.061
Aug	0.49	(0.25–0.95)	0.026	0.50	(0.18–1.09)	0.061
Sep	0.32	(0.12–0.67)	0.001	0.37	(0.13–0.91)	0.019
Oct	0.42	(0.18–0.88)	0.014	0.35	(0.10–0.87)	0.015
Nov	0.44	(0.19–0.92)	0.020	0.36	(0.10–0.87)	0.015

IRR = incidence rate ratio, CI = confidence interval.

Monthly incidence rates of intussusception in boys ranged from 17 to 30 per 100,000 in 2010–2019; and from 8 to 17 per 100,000 in 2020 (Fig. 1). In girls, the monthly incidence rates in 2010–2019 ranged from 12 to 19 per 100,000; and from 8 to 15 per 100,000 in 2020 (Fig. 1). Monthly intussusception IRR for boys was significantly low from April to November. Monthly intussusception IRR for girls was significantly low in May, and from September to November (Table 1). The net risk ratio of intussusception incidence for 2020 compared to 2010–2019 was 0.53 (95% confidence interval [CI], 0.43–0.64) for boys and 0.56 (95% CI, 0.44–0.71) for girls (*P* for difference = 0.017).

We found a reduction in net risk ratio of incidence of intussusception in 2020 compared to 2010–2019, with more profound reduction in boys. Our finding is in line with a report from China, where the cases of enteric-type intussusception has significantly decreased in 2020 compared to 2018–2019.² Following implementation of NPI since February, 2020, there had been reduction in rates of influenza virus, respiratory syncytial virus, and parainfluenza virus in Korea.³ Among the gastrointestinal pathogens, a significant decrease was found for rotavirus and norovirus.⁴ Previous studies have suggested potential link between intussusception with viral (adenovirus, rotavirus) or bacterial pathogens (*Salmonella*, *E. coli*, *Shigella*, and *Campylobacter*).¹ Although no causal conclusion can be drawn from these coinciding NPI implementation and downward trends of intussusception, they are of interest in the context of additional public health impact from social distancing measures, especially

in the boys. Note that the difference in incidence of intussusception for years 2010–2019 vs. 2020 was not significant for January and February, as the NPIs were implemented after February of 2020.

This study is limited by accuracy of case ascertainment of each intussusception cases. More so, it is important to address the magnitude of diagnostic delays during the COVID-19 associated lockdowns.⁵ Further, were unable to obtain individual data on other recognized risk or protective factors. Despite these, this is the first study to evaluate the impact of NPI implementation on incidence of intussusception at a national level.

In conclusion, our nationwide population study showed an association between NPI implementation and reduction of intussusception incidence, with more profound reduction in boys compared to that in girls. Future study should focus on other sex-related mediators causing intussusception and better understanding of the mechanism leading to intussusception, particularly following vaccinating against rotavirus.

Ethics statement

This study was reviewed by the Korea University Anam Hospital Institutional Review Board (IRB) and was deemed exempt from the board oversight, and does not require consent documentation (IRB No. K2021-0817-001).

ACKNOWLEDGMENTS

The authors appreciate the Ministry of Health and Welfare and the Health Insurance Review & Assessment Service of Korea for sharing national health insurance claims data.

REFERENCES

1. Burnett E, Parashar UD, Tate JE. Associations of intussusception with adenovirus, rotavirus, and other pathogens: a review of the literature. *Pediatr Infect Dis J* 2020;39(12):1127-30.
[PUBMED](#) | [CROSSREF](#)
2. Zheng J, Ye Y, Liao Y, Wang B. Fewer paediatric intussusception cases during the COVID-19 pandemic. *J Paediatr Child Health* 2020;56(7):1165.
[PUBMED](#) | [CROSSREF](#)
3. Brown CM, Vostok J, Johnson H, Burns M, Gharpure R, Sami S, et al. Outbreak of SARS-CoV-2 infections, including COVID-19 vaccine breakthrough infections, associated with large public gatherings - Barnstable County, Massachusetts, July 2021. *MMWR Morb Mortal Wkly Rep* 2021;70(31):1059-62.
[PUBMED](#) | [CROSSREF](#)
4. Park S, Michelow IC, Choe YJ. Trend of gastrointestinal infections following nonpharmaceutical interventions, South Korea, 2020. *J Infect Dis* 2021;224(2):368-71.
[PUBMED](#) | [CROSSREF](#)
5. Choi DH, Jung JY, Suh D, Choi JY, Lee SU, Choi YJ, et al. Impact of the COVID-19 outbreak on trends in emergency department utilization in children: a multicenter retrospective observational study in Seoul Metropolitan Area, Korea. *J Korean Med Sci* 2021;36(5):e44.
[PUBMED](#) | [CROSSREF](#)