



ISSN: 2091-2749 (Print)
2091-2757 (Online)

Submitted on: 13 Feb 2024

Accepted on: 14 Mar 2024

<https://doi.org/10.3126/jpahs.v11i1.64499>

Clinical characteristics and outcome of children with Coronavirus disease-19 admitted in a tertiary hospital in Nepal

Anil Raj Ojha¹, Subi Acharya², Bibek Kumar Lal², Puja Amatya¹, Prerana Kansakar¹, Shiva Sharma Chalise³, Rateena Rajbhandari³, Sucharita Tuladhar³, Archana Nepal³, Anjum Shakya⁴, Md Firoz Anjum⁴, Dikshya Pant⁴, Shova Shrestha¹, Bishma Pokhrel³, Shrijana Shrestha⁵

¹Assoc. Prof., ²Medical Officer, ³Asst. Prof., ⁴Lecturer, ⁵Prof., Dept. of Pediatrics, Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Nepal

Abstract

Introduction: COVID-19 is a disease caused by novel coronavirus SARS-CoV-2 that led to a global epidemic resulting in significant morbidity across all ages. This study is intended to find out the clinical presentation of COVID-19 in children and to compare them among different age categories in children.

Method: This is a retrospective study done over the period of one year in COVID facility of Patan hospital. Demographic and clinical profile of children who were tested positive by polymerase chain reaction (PCR) were recorded. The data was compiled in Microsoft Excel 2021 and exported to Statistical Package for Social Sciences (SPSS) Version 27.

Result: During the study period 1639 children were admitted in Patan Hospital with 136(8.30%) of them in the COVID facility. Among these, 41(30.14%) tested positive for SARS-CoV-2 with the median age of 2 years and 26(63.41%) were male. The cases were evenly distributed among infants 13(31.71%), under five 14(34.14%) and 5-14 years old 14(34.14%). The asymptomatic children were 8(19.51%) while 17(41.46%) had mild symptoms. Infants and preschool children had less severe presentation as compared to older children. Fever 33(80.45%) and cough/difficulty in respiration 8(19.51%) were the most common symptoms while respiratory signs like crackles 15(36.59%) and subcostal recession 9(21.95%) were the most common.

Conclusion: SARS-COV-2 infection in children present with mild symptoms. Fever, respiratory signs and symptoms were common. There were no differences in morbidity among different age categories.

Keywords: Child; COVID-19; Nepal; Outcome



How to Cite:

Ojha AR, Acharya S, Lal BK, Amatya P, Kansakar P, Chalise SS, et al. Clinical characteristics and outcome of children with Coronavirus disease-19 admitted in a tertiary hospital in Nepal. Journal of Patan Academy of Health Sciences. 2024 Apr;11(1):3-9.

Correspondence:

Anil Raj Ojha, Dept. of Pediatrics, Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Nepal. Email: anilrajojha@pahs.edu.np

Introduction

COVID-19 is disease caused by newly emergent coronavirus, SARS-CoV-2 and on 11 March 2020, World Health Organization (WHO) declared the Novel coronavirus outbreak a global pandemic.¹ A recent data by WHO showed that there are more than 760 million confirmed cases of COVID-19 and more than 6.9 million deaths.² Nepal officially announced its first confirmed COVID-19 on 24 January 2020 in a 32-year old male patient, who returned from Wuhan city, China.³ A recent data from Nepal has shown that 1157492 cumulative confirmed cases are reported and 12031 cumulative deaths.²

COVID-19 infection in children can have varied presentations. The common presenting symptoms are reported to be fever, cough, dyspnea, fatigue while some children can be asymptomatic.^{3,4,5,6,7,8} Severe disease and mortality is lower in children.⁸ Studies have shown that fever, fatigue, cough and dyspnea were the common presenting symptoms.⁴ Studies have shown that significant cases are asymptomatic and the common presenting symptoms were also fever, cough and pharyngitis.⁵ Moreover, significant number of children with COVID infection were non severe, very few were severe and there was low mortality.⁹

The clinical characteristics of COVID-19 infection in children is largely unknown. This study aims to look at the clinical profile and outcome of those children who were tested positive for corona virus.

Method

This is a retrospective study done at Pediatric department of Patan Academy of Health Sciences (PAHS) which was done over 1 year during the period 1 July 2020 to 30 June 2021. The objective of the study was to determine the burden of SARS-CoV-2 infection in children who were admitted in Pediatric COVID-19 facility at Patan Hospital and the demographic and clinical characteristics of those who were Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) positive for SARS-CoV-2. This included identifying the clinical signs and symptoms of children with COVID-19, their level of severity, outcome and mortality. The study also compared the clinical characteristics (symptoms, signs, duration of stay, oxygen requirement and intensive care unit (ICU) admission) among children with different severity of COVID-19 to mild, moderate and severe COVID-19.

An ethical clearance was obtained from the institutional review committee (IRC) at PAHS

prior conducting this study (Reference number: drs2106291547). All the children from 28 days of life till 14 years of age admitted at COVID facility at Patan Hospital with a positive SARS-CoV-2 RT-PCR were enrolled in the study. All the documents and files of the children were retrieved from the record section of the hospital using their hospital numbers recorded at the admission registry. The cases whose record could not be traced were excluded from analysis. The data on all admitted children with RT-PCR positivity on admission was recorded in a structured proforma which included demographic characteristics like age, sex, symptoms (fever, seizures, fast breathing, shortness of breath, sore throat, myalgia, loose stool weakness, runny nose, vomiting, runny nose rash, red eyes and pain abdomen) and signs (temperature at admission, oxygen saturation, respiratory rate, intercostal/subcostal recession, nasal flaring, grunting, wheeze and crackle in chest auscultation).

All the SARS-CoV-2 RT-PCR positive children were classified into mild, moderate, severe and critical disease as per WHO guideline.⁹ Need of oxygen and the duration of its use, need for admission in ICU and duration and total duration of hospital stay and death if any were also noted.

The raw data was compiled in Microsoft Excel 2021 after which it was exported to SPSS. Frequency distribution of different symptoms was calculated among infants and children ages 1-5 years and 5-14 years. The frequency distribution of signs and symptoms, severity of presentation and sex distribution were also calculated among different age categories of children who were tested positive for SARS-CoV-2. Similarly, duration of ICU admission, duration of oxygen requirement and duration of invasive ventilation was compared between RT PCR positive cases and negative cases.

Result

During the study period, 1639 children were admitted at Patan hospital. Among them 820(50.03%) children were admitted in children ward, 93(5.67%) in Pediatric ICU (PICU), 55(3.36%) in Neonatal ICU (NICU), 535(32.64%) in nursery and 136(8.30%) in COVID facility. Among these 41(30.14%), excluding neonates, tested positive for SARS-CoV-2. The median age for all positive patients was 2 years. There was mortality of one positive case during the study period.

Sex distribution of cases with positive SARS-CoV-2 RT-PCR showed male preponderance 26(63.41%). The cases were evenly distributed among infants 13(31.71%), under five 14(34.14%) and 5-14 years old 14(34.14%).

Majority of children admitted in COVID facility with COVID-19 had either mild 17(41.46%) symptoms or were asymptomatic 6(14.63%), Figure 1. Majority of children who were asymptomatic or had mild symptoms were infants or below 5 years of age, Figure 2.

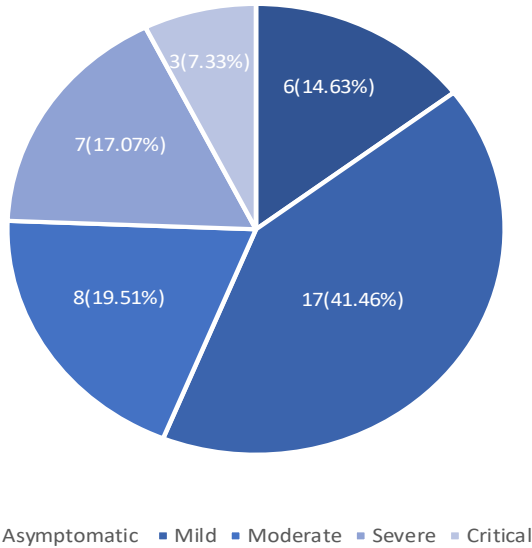


Figure 1. Severity classification of PCR positive cases (N=41)

Fever 33(80.45%) and cough/difficulty in respiration 8(19.51%) were the most common symptoms in these children, Table 1. Likewise, crackles in chest 15(36.6%), subcostal recession 9(22%) and intercostal recession 5(12.20%) were the common

clinical signs were more in older children as compared to young ones, Table 3.

Table 1. Frequency distribution of signs and symptoms of children who were SARS-CoV-2PCR positive (N=41)

Variables	Number (%)
Symptoms	
Fever	33(80.45)
Difficulty respiration/cough	8(19.51)
Weakness	7(17.07)
Seizure	5(12.20)
Loose stool	3(7.32)
Pain abdomen	3(7.32)
Vomiting	2(4.88)
Sore throat	1(2.44)
Body pain	1(2.44)
Nasal discharge	1(2.44)
Signs	
Crackles	15(36.59)
Subcostal recession	9(21.95)
Intercostal recession	5(12.20)
Nasal flare	1(2.44)
Wheeze	1(2.44)
Cyanosis	1(2.44)

Total number of children admitted in intensive care were 16, out of which 4 were PCR positive. There is even distribution of morbidities (duration of oxygen

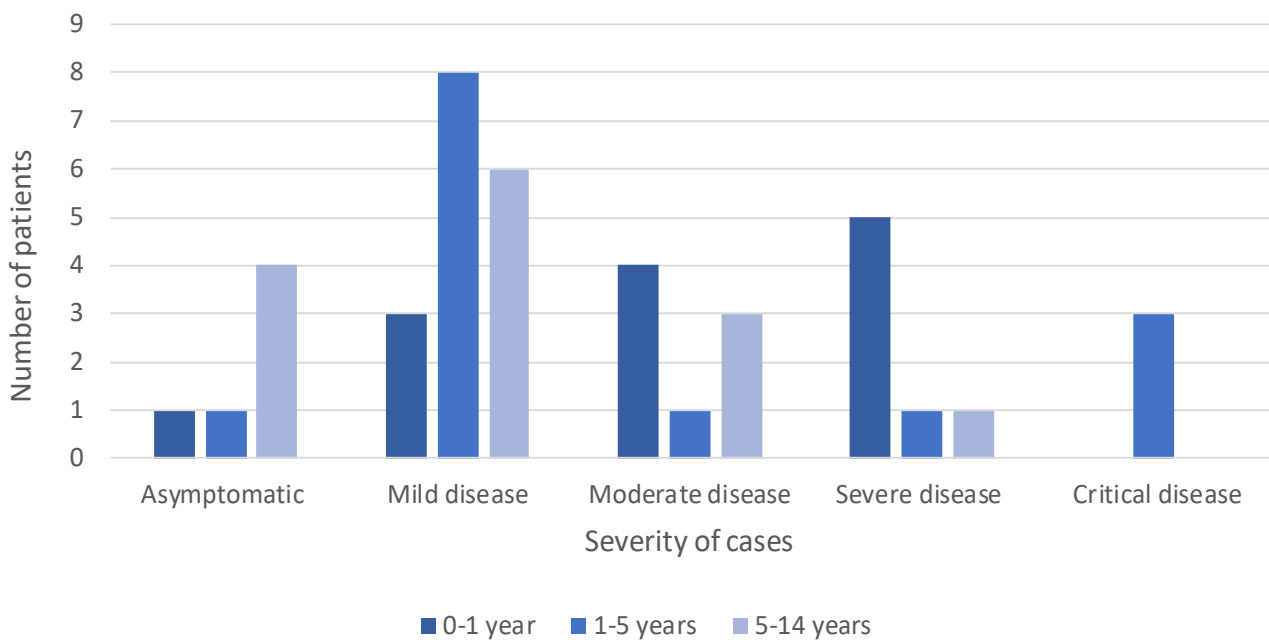


Figure 2. Distribution of PCR positive cases among different age groups, N=41

clinical signs, Table 1. There is an even distribution of signs and symptoms of children with COVID-19 among different age groups, Table 2. These severe

requirement, requirement of invasive ventilation and duration of admission in COVID facility) related

Table 2. Distribution of signs and symptoms among different age groups (N=41)

Variables		Infant	1-5 Years	5-14 Years	Total
Symptoms					
Fever	Yes	12	12	9	33
	No	1	2	5	8
Difficulty respiration/cough	Yes	5	1	1	7
	No	8	13	13	34
Loose stool	Yes	2	0	1	3
	No	11	14	13	38
Pain abdomen	Yes	0	1	2	3
	No	13	13	12	38
Vomiting	Yes	0	1	1	2
	No	13	13	13	39
Nasal discharge	Yes	0	0	1	1
	No	13	14	13	40
Seizure	Yes	1	4	0	5
	No	12	10	14	36
Sore throat	Yes	0	1	0	1
	No	13	13	14	40
Body pain	Yes	0	1	0	1
	No	13	13	14	40
Weakness	Yes	2	4	1	7
	No	11	10	13	34
Signs					
Crackles(Y/N)	Yes	7	5	3	15
	No	6	9	11	26
Subcostal recession(Y/N)	Yes	6	2	1	9
	No	7	12	13	32
Intercostal recession(Y/N)	Yes	3	1	1	5
	No	10	13	13	36
Nasal flare(Y/N)	Yes	0	1	0	1
	No	13	13	14	39
Wheeze(Y/N)	Yes	1	0	0	1
	No	12	14	14	39
Cyanosis(Y/N)	Yes	1	0	0	1
	No	12	14	14	40

to SARS-CoV-2 infection in different age categories of children. The median duration of ICU admission for all children were 72 hours. The median duration

of ICU admission for SARS-CoV-2 RT-PCR positive and negative children were 252 hours and 60 hours respectively. Similarly, the median duration

Table 3. Comparison of severity of SARS COV2 PCR positive cases among different age and sex categories, N=41

Age group		Asymptomatic	Mild	Moderate	Severe	Critical	Total
Infant		1	3	4	5	0	13
1-5 year		1	8	1	1	3	14
5-14 year		4	6	3	1	0	14
Total		6	17	8	7	3	41
Sex	Male	4	11	4	5	2	26
	Female	2	6	4	2	1	15

of admission in COVID facility among positive and negative cases were 336 hours and 60 hours respectively. Out of the 41 PCR positive cases, 11(26.83%) required oxygen supplementation. The median duration of oxygen requirement of children who were RT PCR positive cases and negative cases were 144 hours and 60 hours respectively.

Discussion

This study looked at the demographic profile of children who were tested positive for SARS-CoV-2 RT-PCR. Among the cases, majority of them were male 26(63.41%). Females accounted 15(36.59%). The cases were evenly distributed among infants 13(31.71%), under five 14(34.14%) and 5-14 years old 14(34.14%). A systemic review and meta-analysis also has shown that majority of the affected are male.¹⁰ However, there are studies which have shown fewer male children affected. In a retrospective observational study done in west China, 41% affected were males which is in contrast to our study.¹¹ However, in a study of clinical profile of 332 patients, 172 of them were boys and 162 were girls.¹² A retrospective study done at Wuhan Children's Hospital also found that more boys were infected with COVID-19 with a ratio of 2:1.¹³ There is no obvious plausible reason for the differences. This can be a purely observational finding in different population.

Fever 33(80.45%) and cough 8(19.51%) were the most common symptoms in those children. This is comparable to the findings of the multicenter case series study in China which showed 76% had fever and 62% had cough.¹¹ There are other studies which showed that fever and cough are the most common symptoms in pediatric population.^{14, 15, 16, 17} The lower prevalence of cough in our population might be because majority of our children were asymptomatic or had mild symptoms and it was a standing protocol of admitting all the COVID cases who were tested positive, either symptomatic or asymptomatic.

In our study cohort, respiratory signs were more frequently characterized by presence of lung crackles 15(36.59%) and chest retraction-subcostal and/ intercostal retraction was 14(34.14%), suggesting features of clinical pneumonia. A meta-analysis showed that radiological evidence of pneumonia was a common presentation among those who were symptomatic.¹⁸ The high frequency of respiratory signs in our and other studies might be because coronavirus predominantly affects respiratory tract.¹⁸

Large proportion of the children in our study cohort,

were either asymptomatic 6(14.63%) or had mild symptoms 17(41.46%) and 8(19.51%) had moderate presentation. Very few had severe presentation. This is comparable to a retrospective study done in Hubei province, China which also showed that mild disease was most frequent in Pediatric population.¹⁵ The high percentage of mild disease admitted at our center might be due to the fact that during the initial wave of the pandemic, the trend was to admit almost all the cases who tested positive. The clinical severity of SARS-CoV-2 infection was compared with different age categories which showed that younger children were less symptomatic as compared to older ones. There is no clear reason why younger children tend to have milder symptoms related to COVID. SARS-CoV-2 is reported to be linked to Angiotensin-converting enzyme II (ACE2) cell receptor.¹⁹ SARS-CoV-2 has some similarity in terms of amino acid content which may be able to use ACE2 as a receptor. Recent studies have shown that ACE2 is also likely the cell receptor of SARS-CoV-2. It is hypothesized that because of lower maturity and function (e.g., binding ability) of ACE2 in children, this group of population is less sensitive to SARS-CoV-2 as compared to adults.²⁰

This study showed that majority of the children who tested positive for SARS-CoV-2 were admitted in COVID facility didn't require invasive ventilation which corroborated with higher percentage of asymptomatic and mild cases of COVID positive cases. Only 7.32% required invasive ventilation and 26.83% just needed oxygen supplementation. In a systemic review done in India, it was seen that just 9% of children required oxygen inhalation and 12% required mechanical ventilation which is quite similar to our finding.¹⁰ Similarly, there was no significant difference in duration of oxygen requirement and duration of stay among different age categories of children who tested positive for SARS-CoV-2.

The mortality rate of children in this study was 2.44%. Other studies also showed almost similar findings. In a systemic review and meta-analysis the mortality among SARS-CoV-2 positive cases was shown to be of 1.3%.¹⁰

The children who were SARS CoV-2 PCR positive included in this study stayed longer in intensive care and also stayed longer in COVID facility and required increased duration of oxygen as compared to those who tested negative. This could be due to the fact that many of these children had pneumonia with signs of respiratory distress which required oxygen supplementation. One of the factor contributing to the longer hospital stay among PCR positive cases could be the common practice of keeping the PCR positive cases in the hospital till they tested negative during the initial waves of the pandemic.

This study does have some limitations. Firstly, this is a retrospective study and all the clinical symptoms and signs might not have been documented properly particularly in the pandemic time. This is because there were practical hindrances while managing children during the pandemic as children were admitted to a dedicated COVID facility with a strict infection prevention protocol leading to less frequent and limited contact with the patients and families. Also there were hindrances for a detailed and proper clinical examination as patients were examined through heavy protective gear in the initial phase. Another and the major limitation of the study is the small number of patients. A larger sample size would have reflected the true clinical characteristics.

Conclusion

SARS-COV-2 infection affects all age ranges of pediatric population. Infected children were mostly asymptomatic or present with mild symptoms. Among the symptomatic children, fever and respiratory sign and symptoms were common. There were no difference in the duration of hospital stay, oxygen requirement, or need for invasive ventilation among different age group children with SARS-COV-2 infection.

Acknowledgement

I would like to acknowledge the effort of all the health professionals including pediatricians, all the nursing staff, paramedics and support staffs who worked tirelessly in the difficult time in COVID facility.

Conflict of Interest

None

Funding

None

Author Contribution

Concept, design, planning: ARO, SA, BKL, PA, PK, SSC, RR, ST, AN, AS, MFA, DP, SS, BP, SS; Literature review: ARO, SA, SS, BKL; Data collection: ARO, SA, BKL; Data analysis: ARO, SA, BKL, PA, PK, SSC, RR, ST, AN, AS, MFA, DP, SS, BP, SS; Draft manuscript: ARO, BKL, SS; Revision of draft: ARO, SA, BKL, PA, PK, SSC, RR, ST, AN, AS, MFA, DP, SS, BP, SS; Final manuscript: ARO, SA, BKL, PA, PK, SSC, RR, ST, AN, AS, MFA, DP, SS, BP, SS; Accountability of the work: ARO, SA, BKL, PA, PK, SSC, RR, ST, AN, AS, MFA, DP, SS, BP, SS.

Reference

1. World Health Organization. 2021. WHO Coronavirus (COVID-19) Dashboard. [Online]. [Weblink](#)
2. Vahey GM, Marshall KE, McDonald E, Martin SW, Tate JE, Midgley CM, et al. Symptom profiles and progression in hospitalized and non-hospitalized patients with coronavirus disease, Colorado, USA, 2020. *Emerging infectious diseases*. 2021 Feb;27(2):385-95. [DOI](#)
3. Zimmermann P, Curtis N. COVID-19 in children, pregnancy and neonates: a review of epidemiologic and clinical features. *The Pediatric infectious disease journal*. 2020 Jun;39(6):469-77. [DOI](#)
4. Camara E, Barry IK, Diallo FB, Diallo ML, Diop MM, Cherif MS, et al. Epidemiological and clinical profile of children with Coronavirus disease (COVID-19) at the Center for the Treatment of Epidemics and Infection Prevention (CTEIP) of the University Hospital of Donka in Conakry. *The Pan African Medical Journal*. 2020 Dec 21;37:363. [DOI](#)
5. Atakla HG, Noudohounsi MM, Salami AY, Sacca H, Houinato AG, Barry MC, et al. COVID-19 infection in pediatric subjects: study of 36 cases in Conakry. *The Pan African Medical Journal*. 2020 Dec 8;37(Suppl 1). [Full Text](#)
6. Khan M, Khan H, Khan S, Nawaz M. Epidemiological and clinical characteristics of coronavirus disease (COVID-19) cases at a screening clinic during the early outbreak period: a single-center study. *Journal of medical microbiology*. 2020 Aug 12;69(8):1114-23. [DOI](#)
7. Pérez-Gaxiola G, Flores-Rocha R, Valadez-Vidarte JC, Hernández-Alcaraz M, Herrera-Mendoza G, Real-Lugo MÁ. Clinical and epidemiological characteristics of children with SARS-CoV-2 infection: a case series in Sinaloa. *Boletín médico del Hospital Infantil de México*. 2021 Feb;78(1):18-23. [DOI](#)
8. Badal S, Bajgain KT, Badal S, Thapa R, Bajgain BB, Santana MJ. Prevalence, Clinical characteristics, and Outcomes of Pediatric COVID-19: A systematic review and meta-analysis. *Journal of Clinical Virology*. 2020 Dec 8:104715. [DOI](#)
9. Clinical management of COVID-19- Living guidelines [Internet]. World Health Organization. 2021 Jan 13. [Weblink](#)
10. Panda PK, Sharawat IK, Natarajan V, Bhakat R, Panda P, Dawman L. COVID-19 treatment in children: A systematic review and meta-analysis. *J Family Med Prim Care*. 2021 Sep;10(9):3292-302. [DOI](#)
11. Zhang C, Gu J, Chen Q, Deng N, Li J, Zhou X. Clinical and epidemiological characteristics of Pediatric SARS-CoV-2 infections in China: A multicenter case series. *PLoS Med*. 2020 Jun 16;17(6):e1003130. [DOI](#)
12. Mania A, Faltin K, Mazur-Melewska K, Malecki P, Jończyk-Potoczna K, Lubarski K, et al. Clinical Picture and Risk Factors of Severe Respiratory Symptoms in COVID-19 in Children. *Viruses*. 2021 Nov 25;13(12):2366. [DOI](#)
13. Du H, Dong X, Zhang JJ, Cao YY, Akdis CA, Huang PQ, et al. Clinical characteristics of 182 pediatric COVID-19 patients with different severities and allergic status.

- Allergy. 2021 Feb;76(2):510-32. DOI
14. Zhang T, Cui X, Zhao X, Wang J, Zheng J, Zheng G, et al. Detectable SARS-CoV-2 viral RNA in feces of three children during recovery period of COVID-19 pneumonia. *J Med Virol.* 2020 Jul;92(7):909-14. DOI
 15. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, et al. Epidemiology of COVID-19 among children in China. *Pediatrics.* 2020 Jun; 145(6):e20200702. DOI
 16. Cui X, Zhao Z, Zhang T, Guo W, Guo W, Zheng J et al. A systematic review and meta-analysis of children with coronavirus disease 2019 (COVID-19). *Journal of Medical Virology.* 2021 Feb;93(2):1057-69. DOI
 17. Ma X, Liu S, Chen L, Zhuang L, Zhang J, Xin Y. The clinical characteristics of pediatric inpatients with SARS-CoV-2 infection: A meta-analysis and systematic review. *Journal of Medical Virology.* 2021 Jan;93(1):234-40. DOI
 18. Li W, Moore MJ, Vasilieva N, Sui J, Wong SK, Berne MA, et al. Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. *Nature.* 2003 Nov 27;426(6965):450–4. DOI
 19. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature.* 2020 Mar;579(7798):270–3. DOI
 20. Wrapp D, Wang N, Corbett KS, Goldsmith JA, Hsieh CL, Abiona O, et al. Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. *Science.* 2020 Mar 13;367(6483):1260–3. DOI