

Viral kinetics of SARS-CoV-2 in patients with COVID-19

Da Young Kim,¹ Ju-Hyung Lee,² Hyeon Jeong Oh,¹ Jun-Won Seo,¹ Na Ra Yun,¹ Choon-Mee Kim,³ Dong-Min Kim¹

¹Department of Internal Medicine, ³Department of Premedical Science, College of Medicine, Chosun University, Gwangju, Republic of Korea, ²Department of Preventive Medicine, Jeonbuk National University Medical School, Jeonju, Republic of Korea

INTRODUCTION

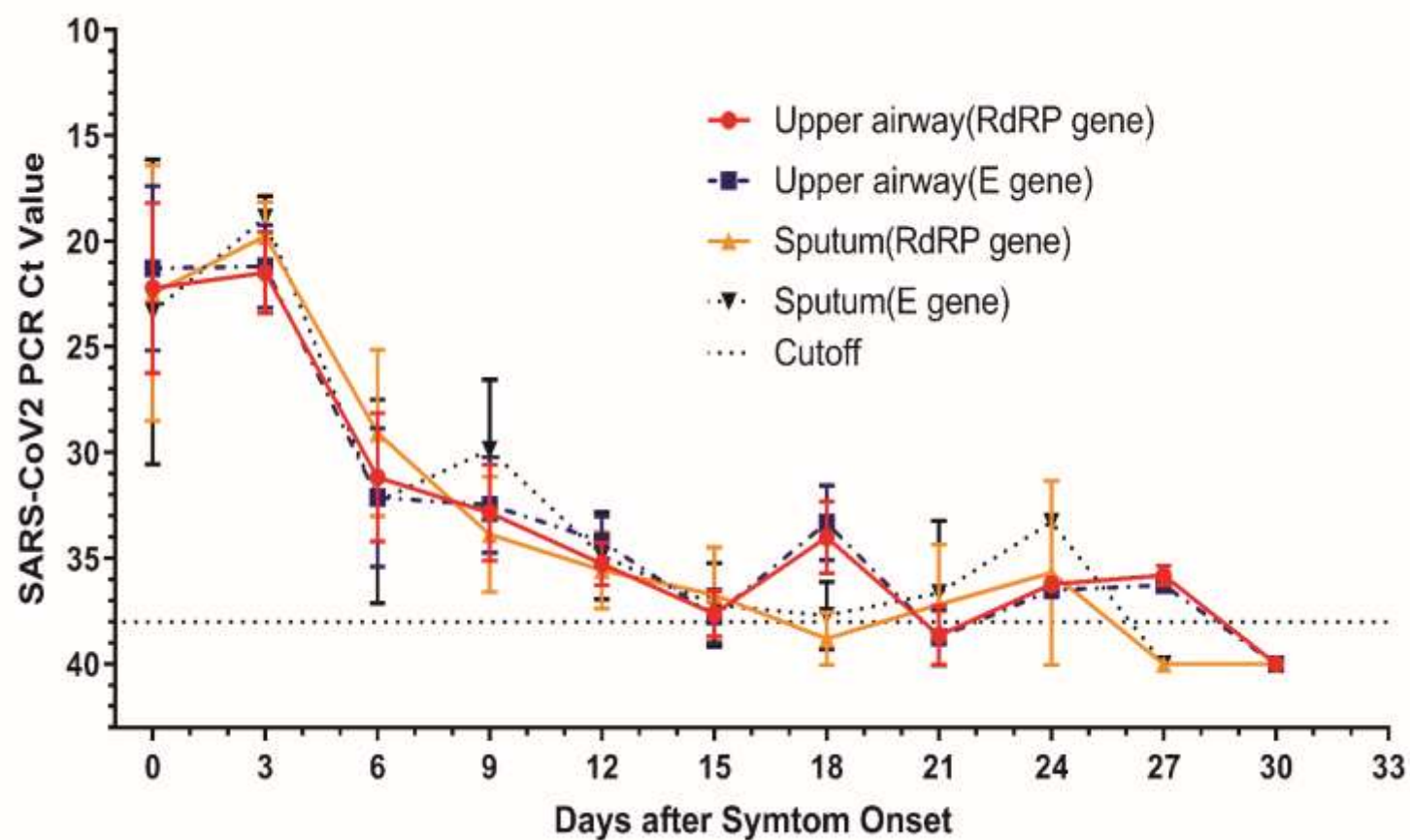
- We investigated the viral kinetics and compared viral loads between patients with mild and severe COVID-19
- We determined the viral kinetics of 10 patients diagnosed with COVID-19 at Chosun University Hospital. Six patients were classified into the “mild” group and 4 into the “severe” group according to supplemental oxygen use during admission
- Chest radiograph scores during hospitalization were obtained

SUMMARY

- Viral load and chest radiograph scores were significantly different between the severe and mild groups of COVID-19 patients

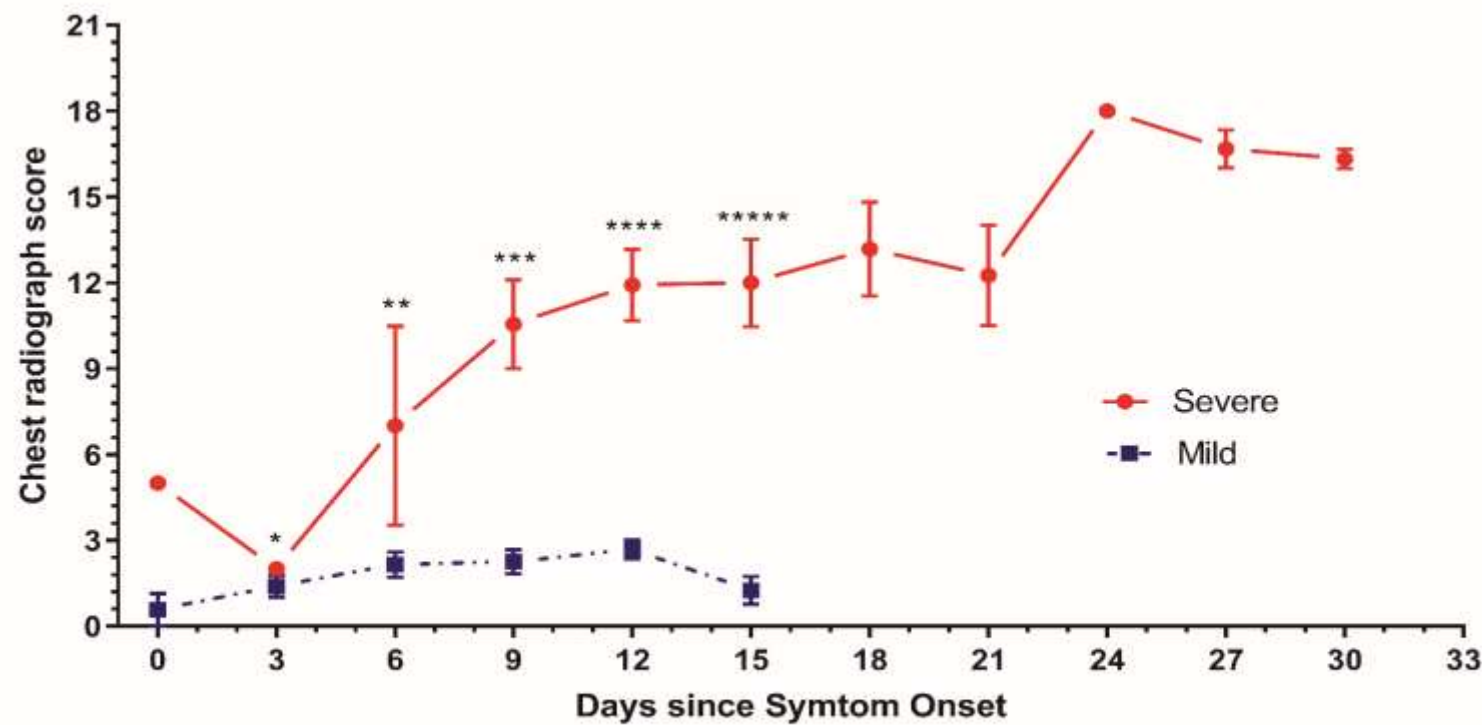
RESULTS

1. Ct values when the *RdRP* gene and *E* gene were targeted to detect SARS-CoV-2 on the basis of the days after symptom onset in all the patients



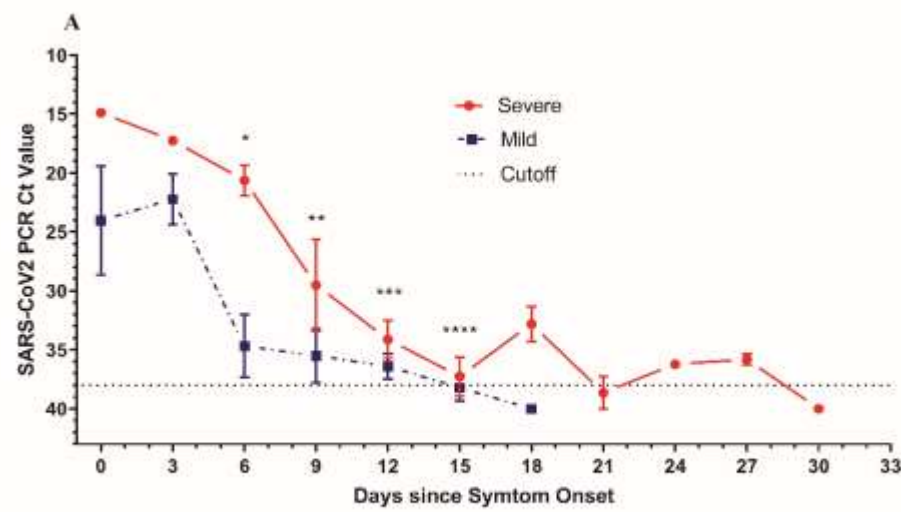
RESULTS

2. Chest radiograph scores according to the days after symptom

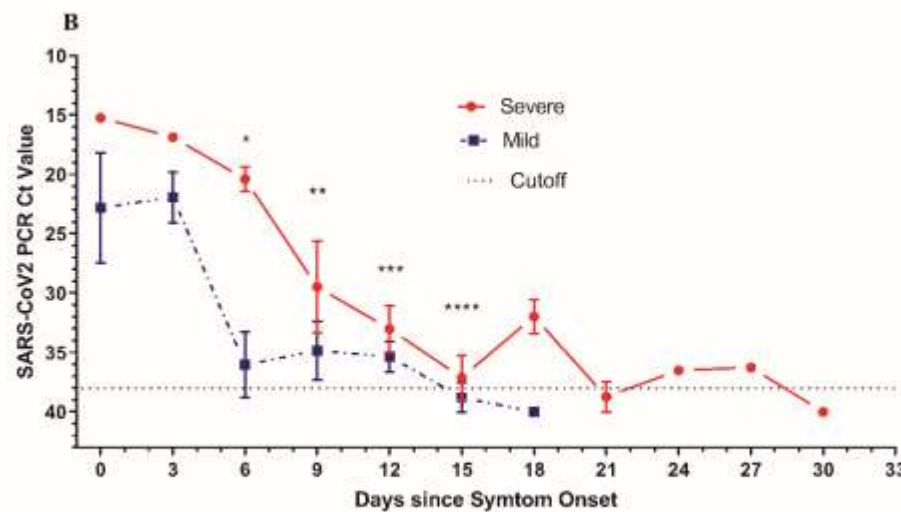


*p=0.4414 **p=0.0741 ***p=0.0005 ****p=0.0069 *****p=0.0035

3. Ct values when the *RdRP* gene (A) and *E* gene (B) were targeted by using sputum specimens to detect SARS-CoV-2 on the basis of the days after symptom onset

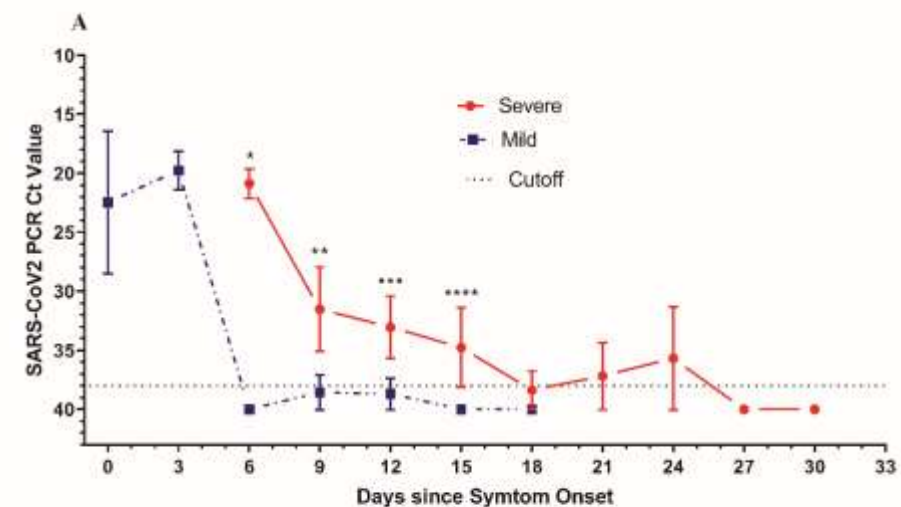


*p=0.044 **p=0.2129 ***p=0.4647 ****p=0.8786

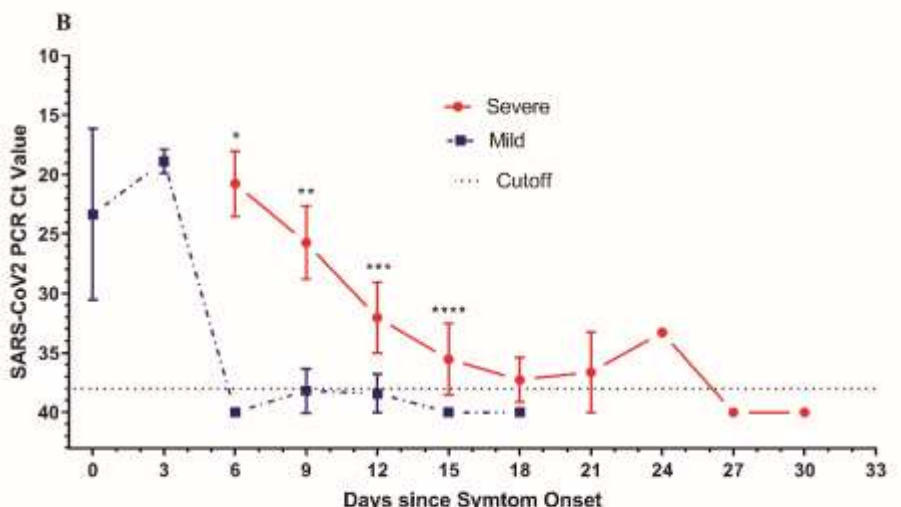


*p=0.0331 **p=0.2129 ***p=0.3472 ****p=0.6084

4. Ct values when the *RdRP* gene and *E* gene were targeted to detect SARS-CoV-2 on the basis of the days after symptom onset in all the patients



*p=0.0528 **p=0.0641 ***p=0.0963 ****p=0.2416



*p=0.0528 **p=0.0641 ***p=0.5194 ****p=0.1797

5. Mean Ct values when the *E* gene and *RdRP* gene were targeted to detect SARS-CoV-2 on the basis of the days after symptom onset

Days after symptom onset	Ct value (Mean \pm SEM)							
	Upper airway swab (RdRP gene)		Upper airway swab (E gene)		Sputum specimen (RdRP gene)		Sputum specimen (E gene)	
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM
0*	22.20	4.00	21.28	3.88	22.46	6.02	23.33	7.18
3	21.49	1.91	21.19	1.94	19.76	1.60	18.88	1.01
6	31.16	3.02	32.11	3.26	29.07	3.92	32.30	4.79
9	32.83	2.25	32.46	2.24	33.86	2.72	29.86	3.30
12	35.25	0.98	34.17	1.16	35.55	1.79	34.86	2.04
15	37.62	1.06	37.73	1.22	36.72	2.22	37.20	1.96
18	34.00	1.68	33.32	1.75	38.79	1.21	37.71	1.58
21	38.64	1.37	38.72	1.29	37.18	2.82	36.62	3.39
24	36.22	NA	36.50	NA	35.637	4.33	33.28	NA
27	35.80	0.45	36.25	0.17	40.00	NA	40.00	0.00
30	40.00	NA	40.00	NA	40.00	NA	40.00	NA

Abbreviation: SEM, standard error of the mean; NA, not available

*Asymptomatic phase or incubation period was included in day 0

6. Patient characteristics

Group	Patient	Age/Sex	Underlying disease	ACEi/ARB	Treatment (days)	O ₂ therapy	Incubation period (days) ^a
Severe group (O ₂ inhalation needed)	A	79/F	DM	None	Lopinavir/ritonavir (8)	MV	1
	B	79/M	HTN/DM	None	Lopinavir/ritonavir (10)	MV	9
	C	75/F	HTN/CVA	None	Lopinavir/ritonavir (10)	NP	1
	D	61/F	None	None	Lopinavir/ritonavir (11)	HF + NP	8
Mild group (O ₂ inhalation not needed)	E	46/M	HTN/Dyslipidemia	None	None	None	-2 ^b
	F	30/M	HTN	Azilsartan	None	None	1
	G	30/M	None	None	None	None	0
	H	29/F	None	None	None	None	1
	I	74/M	HTN/DM	Perindopril	Lopinavir/ritonavir (8)	None	7
	J	36/M	None	None	Hydroxychloroquine (5)	None	-1 ^b

Abbreviation: ACEi, angiotensin-converting enzyme inhibitor; ARB, angiotensin II receptor blocker; DM, diabetes mellitus; HTN, hypertension; CVA, cerebrovascular accident; MV, mechanical ventilator; NP, nasal prong; HF, high-flow nasal cannula

The incubation period (days)^a is the period from the date of symptom onset to confirmation

A negative value, -2^b and -1^b, indicates the number of days before symptom onset