BRIEF REPORT

Temporal development of research publications on SARS-CoV-2 and COVID-19 [version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic has affected daily life throughout the world. The scientific community has globally responded to the pandemic with research on an unprecedented scale to help prevent disease spread and terminate the pandemic, resulting in a proliferation of scientific publications. In this article, the temporal trend of research on COVID-19 is analyzed to describe its development and inform a prediction of its future. Four other viruses are included in the analysis as negative or positive controls to illustrate that the concerns of the general public and/or the interest of the scientific community are major driving forces in the development of research. Our analysis predicts that COVID-19 and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) will be major topics of research until at least 2025. We discuss the implications of our analysis for three sectors of community: researchers, epidemiologists, and young students.

Keywords

COVID-19, SARS-CoV-2, HCV, HIV, Ebola, Zika, PubMed, Scientometrics

This article is included in the **Emerging Diseases and Outbreaks** gateway.

This article is included in the **Research on Research, Policy & Culture** gateway.

Open Peer Review

Approval Status

	1	2	3
version 2 (revision) 21 Apr 2022			 view
version 1 12 Apr 2021	 view	 view	

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2. **Mahmoud Nassar** , Icahn School of Medicine at Mount Sinai/NYC Health-Hospitals, Queens, USA
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Any reports and responses or comments on the article can be found at the end of the article.

This article is included in the **Coronavirus** collection.

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Introduction

The recent outbreak of coronavirus disease 2019 (COVID-19) has imposed an unprecedented and devastating burden on the world,¹ including a serious encumbrance to health care systems.² Collectively the scientific community has responded to the pandemic by researching the spread of the disease and its causative pathogen, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), in order to understand and terminate the pandemic. These efforts have resulted in a vast amount of publications. We believe it would be worthwhile to analyze the trend of the publications in order to predict the future of research in this area.

We have previously demonstrated that the number of publications may be a reliable quantitative measure of the magnitude of research activity of a biological or biomedical science.³ In conjunction with regression analysis, the method of assessing research activity of a biological or biomedical discipline based on the number of publications in the field has been found to be effective in the prognostication of the future of biomedical fields by extrapolation of the best fit equation.⁴ The method has successfully been applied to various fields such as food sciences,⁵ epigenetics,⁶ metabolomics,⁷ and environmental sciences.⁸

In this paper, we apply the method mentioned above to COVID-19 research to quantitatively describe the temporal development of the research and predict its future. We also include four other viruses in the study; hepatitis C virus (HCV) and HIV as negative controls without any apparent outbreaks in the period from January to November, 2020, and Ebola virus disease (EVD) and Zika virus (ZIKV) as positive controls of epidemiological outbreak during the period of examination from January 2014 to November 2020.

Methods

To quantitatively investigate the trend of research related to the five viruses (SARS-CoV-2, HCV, HIV, EVD, and ZIKV), we searched the **PubMed** database on December 23, 2020. Our search strategy was as follows for the different viruses: (The superscripts a and b in the search phrases represent month and year, respectively.)

SARS-CoV-2: (((COVID [Title/Abstract]) OR (COVID-19[Title/Abstract])) OR (SARS-CoV-2[Title/Abstract])) AND (“2020/M^a”[Date - Publication]: “2020/M^b”[Date - Publication])

HCV: (((HCV [Title/Abstract]) OR (“hepatitis C virus”[Title/Abstract])) AND (virus [Text Word])) AND (“2020/M^a”[Date - Publication]: “2020/M^b”[Date - Publication])

HIV: (((HIV [Title/Abstract]) OR (“human immunodeficiency virus”[Title/Abstract])) AND (virus [Text Word])) AND (“2020/M^a”[Date - Publication]: “2020/M^b”[Date - Publication])

Ebola: ((Ebola [Title/Abstract]) AND (virus [Text Word])) AND (“Y^b/M^a”[Date - Publication]: “Y^b/M^a”[Date - Publication])

Zika: ((ZIKA [Title/Abstract]) AND (virus [Text Word])) AND (“Y^b/M^a”[Date - Publication]: “Y^b/M^a”[Date - Publication])

The number of publications on each virus was manually recorded on a monthly basis for eleven months for SARS-CoV-2, HCV, and HIV from January to November 2020, and for eighty three months for EVD and ZIKV from January 2014 to November 2020 for further investigation of data. Subsequent nonlinear regression analysis of the PubMed search results was conducted to obtain equation of best fit using **SigmaPlot** (version 11; Systat Software, Inc., San Jose, CA).

Results

We retrieved monthly publication numbers of the five viruses from the Pubmed database, and obtained the best fitting equation for each virus. Our results are summarized in **Figure 1** and **Table 1**. We identified that temporal dynamics of publications related to the five viruses exhibit four characteristics.

First, a sigmoidal equation (**Equation 1**) was found to be the best quantitative description of the publication trend of COVID-19 research:

$$f_1(x) = \frac{a}{1 + \exp\left(\frac{c-x}{b}\right)} \quad (\text{Equation 1})$$

Figure 1. Number of research publications related to five viruses. The solid line in each graph represents the best fit. The corresponding year in the panel B is presented above the x-axis. SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Table 1. Fitting parameters (a , b , and c) and associated standard errors (SE) and the squared Pearson correlation coefficients (R^2).

Equation	Virus	$a \pm SE$	$b \pm SE$	$c \pm SE$	R^2
Eq. (1)	SARS-CoV-2	12900 ± 370	0.67 ± 0.12	4.1 ± 0.14	0.9803
	Ebola	150 ± 65	1.8 ± 0.87	9.5 ± 1.9	0.8345
	Zika	220 ± 3.9	0.96 ± 0.088	25.8 ± 0.1	0.9916
Eq. (2)	Ebola	150 ± 8.7	0.013 ± 0.001		0.5522
	Zika	300 ± 22	0.01 ± 0.001		0.5466

The value of each parameter is listed in Table 1. The mathematical meaning of each parameter can be found in our previous publication.⁴ In brief, the parameter “*a*” represents an asymptotic maximum value of the function, “*b*” is related to the shape of the function, and “*c*” is the year when the value of the function is half of the asymptotic maximum value.⁴ The sigmoidal kinetics observed in the research trend of COVID-19 (Figure 1) is congruent with other areas of research such as bioinformatics, epigenetics, food sciences, and environmental sciences.^{4–7}

Second, there was no significant correlation between the temporal point and the number of research publications on HCV and HIV during the time period examined from January to November 2020 ($p = 0.240$ for HCV, and $p = 0.367$ for HIV) (Figure 1). This can be attributed to the absence of any significant outbreaks of HCV or HIV during the time period; while these viruses are important in a biomedical sense,^{10,11} those viruses have likely been endemic.^{12,13}

Third, two examples of outbreaks in the decade of 2010, EVD¹⁴ and ZIKV,¹⁵ exhibit biphasic kinetics in the publication trend (Figure 1). The phase of sharp increase in number of publications, which overlaps with the time of each outbreak, also follows sigmoidal kinetics (Equation 1 and Table 1) as does COVID-19. The second phase, a decreasing phase, shows a slow and gradual decline that can be described by an exponential decay function (Equation 2):

$$f_2(x) = a \times \exp(-bx) \quad (\text{Equation 2})$$

Fourth, the exponential nature of the decay kinetics may be valuable for the prediction of the future of COVID-19 research. In the case of EVD, the publication number started to decrease, when $x = 11$ (Figure 1), where the publication number is 123 (see underlying data⁹) corresponding to 82% of the asymptotic maximum value of 150 (Table 1). Zika research started to decrease, when $x = 33$ (Figure 1), where the publication number is 222 (see underlying data⁹) corresponding to 101% of its asymptotic maximum value of 219 (Table 1). As of June, 2020, COVID-19 research reached 95% of its asymptotic maximum value of 12900 (Figure 1): $12288/12900 = 0.95$ (underlying data⁹ and Table 1). The quantitative comparison between SARS-CoV-2 and the two viruses suggests that the case of ZIKV is a more appropriate model for the prediction of COVID-19 research. Despite the apparent similarity of the research trend between SARS-CoV-2 and ZIKV, one should note that there is a substantial difference in the asymptotic maximum value (*a* in Equation 1) between these two areas of research: SARS-CoV-2 has an almost 60 times ($\cong 12900/220$) larger value of *a* than ZIKV (Table 1).

Discussion

The results of our research have implications for three sectors of the global community. One is for the scientific community in that research on COVID-19 is predicted to be active for a long time, even after commencing a downward trend. According to our mathematical model of the research on ZIKV, it will take COVID-19 research approximately 5 years (65.8 months) to reach half of its maximum value: $f_2(98.8) = f_1(33)/2$ and $98.8 - 33 = 65.8$. While it is not certain when the publications on COVID-19 will start to decline, we expect that it will remain a major topic of research until at least 2025. This prediction may serve as a guide in planning research on COVID-19. The second implication of our results is for researchers in epidemiology as the method introduced in this paper can be easily applied to other epidemics and pandemics. The third implication is for young students. Our analysis of the ongoing research on COVID-19 should show them that science is a valuable way of contributing to humanity by providing solutions for public concerns such as COVID-19.

Data availability

Underlying data

Figshare: Number of PubMed-indexed articles related to five viruses; SARS-CoV-2, HCV, HIV, Ebola, and Zika. <https://doi.org/10.6084/m9.figshare.12958361.v3>⁹

This project contains the following underlying data:

- covid_figshare_kang.csv (spreadsheet of the number of research publications found relating to five viruses).

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

Acknowledgments

We would like to thank Kathi Canese, a Program Manager for the support department of PubMed, for the valuable advice in the search of PubMed.

References

1. Etienne CF, Fitzgerald J, Almeida G, *et al.*: **COVID-19: transformative actions for more equitable, resilient, sustainable societies and health systems in the Americas.** *BMJ Glob Health.* 2020 Aug; **5**(8): e003509.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
2. Hsiang W, Forman H, Jain S, *et al.*: **COVID-19 testing capabilities at urgent care centers in states with greatest disease burden [version 2; peer review: 2 approved].** *F1000Res.* 2020; **9**: 328.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
3. Kang J, Purnell CB: **Implications for undergraduate education of two interdisciplinary biological sciences: biochemistry and biophysics.** *CBE Life Sci Educ.* 2011 Summer; **10**(2): 111–112.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
4. Kang J, Park S, Venkat A, *et al.*: **Quantitative Analysis of the Trends Exhibited by the Three Interdisciplinary Biological Sciences: Biophysics, Bioinformatics, and Systems Biology.** *J Microbiol Biol Educ.* 2015 Dec 1; **16**(2): 198–202.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
5. Kang J, Clifton EC: **Quantitative Analysis of Food Science Trends.** *J Food Sci.* 2018 Oct; **83**(10): 2405–2406.
[PubMed Abstract](#) | [Publisher Full Text](#)
6. Kang J, Daines JR, Warren AN, *et al.*: **Epigenetics for the 21st-Century Biology Student.** *J Microbiol Biol Educ.* 2019 Dec 18; **20**(3): 20.3.56.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
7. Kang J, Song S, Cowan ML: **Comment on Metabolomics for a Millenniums-Old Crop: Tea Plant (*Camellia sinensis*).** *J Agric Food Chem.* 2020 Jan 15; **68**(2): 697–698.
[PubMed Abstract](#) | [Publisher Full Text](#)
8. Kang J, Kang AM: **Trend of the research on rare earth elements in environmental science.** *Environ Sci Pollut Res Int.* 2020 May; **27**(13): 14318–14321.
[PubMed Abstract](#) | [Publisher Full Text](#)
9. Kang J, Kang E, Cowan ML: **Number of PubMed-indexed articles related to five viruses; SARS-CoV-2, HCV, HIV, Ebola, and Zika.** *Figshare.* V3. 2020.
[Publisher Full Text](#)
10. Mukhtar NA, Ness EM, Jhaveri M, *et al.*: **Epidemiologic features of a large hepatitis C cohort evaluated in a major health system in the western United States.** *Ann Hepatol.* 2019 Mar-Apr; **18**(2): 360–365.
[PubMed Abstract](#) | [Publisher Full Text](#)
11. Buchacz K, Armon C, Palella FJ Jr, *et al.*: **HIV Outpatient Study (HOPS) Investigators. The HIV Outpatient Study-25 Years of HIV Patient Care and Epidemiologic Research.** *Open Forum Infect Dis.* 2020 Apr 11; **7**(5): ofaa123.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
12. Alter MJ: **Epidemiology of hepatitis C virus infection.** *World J Gastroenterol.* 2007 May 7; **13**(17): 2436–41.
[Publisher Full Text](#)
13. Assefa Y, Gilks CF: **Ending the epidemic of HIV/AIDS by 2030: Will there be an endgame to HIV, or an endemic HIV requiring an integrated health systems response in many countries?** *Int J Infect Dis.* 2020 Nov; **100**: 273–277.
[PubMed Abstract](#) | [Publisher Full Text](#)
14. Kamorudeen RT, Adedokun KA, Olanmoye AO: **Ebola outbreak in West Africa, 2014-2016: Epidemic timeline, differential diagnoses, determining factors, and lessons for future response.** *J Infect Public Health.* 2020 Jul; **13**(7): 956–962.
[PubMed Abstract](#) | [Publisher Full Text](#)
15. Madewell ZJ, López MR, Espinosa-Bode A, *et al.*: **Inverse association between dengue, chikungunya, and Zika virus infection and indicators of household air pollution in Santa Rosa, Guatemala: A case-control study, 2011-2018.** *PLoS One.* 2020 Jun 19; **15**(6): e0234399.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Open Peer Review

Current Peer Review Status:

Version 1

Reviewer Report 01 December 2021

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Mahmoud Nassar

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² Queens Hospital Center, Queens, NY, USA

Dear Authors

Thank you so much for your great effort. This is an interesting topic. Here are some opportunities for improvement:

- Please justify the selection of the four viruses compared to COVID-19. I propose to make a comparison table with similarities and differences.
- Please comment on why this article did not include other databases like Medline or Embase.
- Please mention other factors affecting that affect the number of publications (direct and indirect).
- Please comment on changes to the journals' publication policies, time, APC, indexing, etc.
- Please comment on the global quarantine, governmental closure, and the negative impact on developed and developing countries' economic and social aspects.
- I suggest commenting on the trend or theme¹ of research development of the diagnosis, prevention, COVID-19 complication, treatment, vaccination, COVID-19 vaccine-induced complications[ref2]^{3,4}, COVID-19 variants, COVID-19 vaccination booster dose.
- There are many publications as case reports, case series, descriptive, case-control, RCT, meta-analysis, and umbrella review. For each phase and with other comorbidities^{5,6}[ref7]⁸. NB: All citations are my own papers and for guidance. You do not need to cite them.
- Please create a limitation section and mention these factors as a study limitation. At least try to mention these factors as limitations in the study.

- I suggest creating a diagram to demonstrate the evolution of COVID-19 research.

References

1. Nassar M, Nso N, Alfshawy M, Novikov A, et al.: Current systematic reviews and meta-analyses of COVID-19. *World J Virol.* 2021; **10** (4): 182-208 [PubMed Abstract](#) | [Publisher Full Text](#)
2. Nassar M, Chung H, Dhayaparan Y, Nyein A, et al.: COVID-19 vaccine induced rhabdomyolysis: Case report with literature review. *Diabetes Metab Syndr.* **15** (4): 102170 [PubMed Abstract](#) | [Publisher Full Text](#)
3. Nassar M, Nso N, Gonzalez C, Lakhdar S, et al.: COVID-19 vaccine-induced myocarditis: Case report with literature review. *Diabetes Metab Syndr.* **15** (5): 102205 [PubMed Abstract](#) | [Publisher Full Text](#)
4. Kong J, Cuevas-Castillo F, Nassar M, Lei C, et al.: Bullous drug eruption after second dose of mRNA-1273 (Moderna) COVID-19 vaccine: Case report. *Journal of Infection and Public Health.* 2021; **14** (10): 1392-1394 [Publisher Full Text](#)
5. Alfshawy M, Elbendary A, Mohamed M, Nassar M: COVID-19 Mortality in Transplant Recipients. *Int J Organ Transplant Med.* 2020; **11** (4): 145-162 [PubMed Abstract](#)
6. Alfshawy M, Elbendary A, Younes A, Negm A, et al.: Diabetes mellitus and Coronavirus Disease (Covid-19) Associated Mucormycosis (CAM): A wake-up call from Egypt. *Diabetes Metab Syndr.* **15** (5): 102195 [PubMed Abstract](#) | [Publisher Full Text](#)
7. Alfshawy M, Nso N, Nassar M, Ariyaratnam J, et al.: Liver transplantation during global COVID-19 pandemic. *World J Clin Cases.* 2021; **9** (23): 6608-6623 [PubMed Abstract](#) | [Publisher Full Text](#)
8. Nassar M, Nso N, Ariyaratnam J, Sandhu J, et al.: Coronavirus disease 2019 and renal transplantation. *World J Clin Cases.* 2021; **9** (27): 7986-7997 [PubMed Abstract](#) | [Publisher Full Text](#)

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Clinical research, COVID-19, Cardiovascular Diabetes, and Organ

transplantation.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Apr 2022

Jonghoon Kang

Dear Dr Nassar,

Thank you for your thoughtful comments (in plain fonts) on our paper. Here, we respond to your comments (in bold font).

Please justify the selection of the four viruses compared to COVID-19. I propose to make a comparison table with similarities and differences.

Justification for the selection of the four viruses is comparison of COVID-19 to a negative control group (HCV and HIV) without any recent breaks and to a positive control group (EVD and ZIKV) with recent breaks. We selected those viruses based on our familiarity with them. We have included a comparison table (Table 1) in the revision.

Please comment on why this article did not include other databases like Medline or Embase.

We have included our justification for the selection of PubMed in our study in Discussion.

Please mention other factors affecting that affect the number of publications (direct and indirect).

Surely public interests are one of the factors affecting the number of publications as noted in our paper. However, we are not aware of any other factors for sure, even though there must be various factors. For example, we expect that the number of researchers and number of journals in a particular field will affect the number of publications in the field. It will be of great interest recognizing those factors in future research.

Please comment on changes to the journals' publication policies, time, APC, indexing, etc.

Those factors must play a role in the trend of publications. However, we do not have any explanation for the point.

Please comment on the global quarantine, governmental closure, and the negative impact on developed and developing countries' economic and social aspects.

Thank you for the additional guidance. However, the nature of this paper is to forecast the number of publications in the future by analyzing the trends and not related to the global quarantine, governmental closure, and the negative impact on developed and developing countries' economic and social aspects. That is not to say these areas are any less important but we are chiefly concerned with the mathematical nature of the trends we saw from our gathering of publication counts on PubMed.

I suggest commenting on the trend or theme¹ of research development of the diagnosis, prevention, COVID-19 complication, treatment, vaccination, COVID-19 vaccine-induced complications[ref2],3,4, COVID-19 variants, COVID-19 vaccination booster dose. There are many publications as case reports, case series, descriptive, case-control, RCT, meta-analysis, and umbrella review. For each phase and with other comorbidities^{5,6},[ref7],8. NB: All citations are my own papers and for guidance. You do not need to cite them.

Please create a limitation section and mention these factors as a study limitation. At least try to mention these factors as limitations in the study.

I suggest creating a diagram to demonstrate the evolution of COVID-19 research.

References

1. Nassar M, Nso N, Alfshawy M, Novikov A, et al.: Current systematic reviews and meta-analyses of COVID-19. *World J Virol.* 2021; 10 (4): 182-208 PubMed Abstract | Publisher Full Text
2. Nassar M, Chung H, Dhayaparan Y, Nyein A, et al.: COVID-19 vaccine induced rhabdomyolysis: Case report with literature review. *Diabetes Metab Syndr.* 15 (4): 102170 PubMed Abstract | Publisher Full Text
3. Nassar M, Nso N, Gonzalez C, Lakhdar S, et al.: COVID-19 vaccine-induced myocarditis: Case report with literature review. *Diabetes Metab Syndr.* 15 (5): 102205 PubMed Abstract | Publisher Full Text
4. Kong J, Cuevas-Castillo F, Nassar M, Lei C, et al.: Bullous drug eruption after second dose of mRNA-1273 (Moderna) COVID-19 vaccine: Case report. *Journal of Infection and Public Health.* 2021; 14 (10): 1392-1394 Publisher Full Text
5. Alfshawy M, Elbendary A, Mohamed M, Nassar M: COVID-19 Mortality in Transplant Recipients. *Int J Organ Transplant Med.* 2020; 11 (4): 145-162 PubMed Abstract
6. Alfshawy M, Elbendary A, Younes A, Negm A, et al.: Diabetes mellitus and Coronavirus Disease (Covid-19) Associated Mucormycosis (CAM): A wake-up call from Egypt. *Diabetes Metab Syndr.* 15 (5): 102195 PubMed Abstract | Publisher Full Text
7. Alfshawy M, Nso N, Nassar M, Ariyaratnam J, et al.: Liver transplantation during global COVID-19 pandemic. *World J Clin Cases.* 2021; 9 (23): 6608-6623 PubMed Abstract | Publisher Full Text
8. Nassar M, Nso N, Ariyaratnam J, Sandhu J, et al.: Coronavirus disease 2019 and renal transplantation. *World J Clin Cases.* 2021; 9 (27): 7986-7997 PubMed Abstract | Publisher Full Text

Thank you for the additional guidance. However, given the nature of this publication is a brief report we feel it would not be necessary to overburden the scope of the paper itself with this addition of the perceived diagram. Brief Reports are small, often preliminary studies, descriptions of unexpected and perhaps unexplained observations or lab protocols that can be described in a short report with a few illustrations (figures/tables), or even a single figure. <https://f1000research.com/for-authors/article-guidelines/brief-report>.

While qualitative investigation on the evolution of COVID-19 research is beyond the scope of our research, your suggestion of including a limitation section is deemed valuable for our research, and we discussed limitation of our approach in the revised edition. We also included two of the references you suggested in our revision. Thank you for suggesting the references.

Competing Interests: No competing interests were disclosed.

Reviewer Report 27 October 2021

<https://doi.org/10.5256/f1000research.45188.r97764>

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Ludovico Abenavoli

Department of Health Sciences, Magna Graecia University, Catanzaro, Italy

General comments:

I read with interest this article. It provides data on the scientific production during the pandemic, with regards to 2020. The background is solid, the results have been discussed, and the conclusion supported the data.

Minor point:

I suggest to report the data stratified for original articles, review, brief report and letter to the editor related to COVID-19 topic.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology of COVID-19, COVID-19 clinical aspects, COVID-19 research trends

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 16 Apr 2022

Jonghoon Kang

Dear Dr. Abenavoli

We appreciate your time and effort for reviewing our paper. In the revised manuscript, we have included the data you suggested. We believe the added data will enhance the quality of our work and thank you for the suggestions.

Competing Interests: No competing interests were disclosed.

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