**Report#1**

The present article uses the latent growth curve model to capture the interindividual and intraindividual changes in Covid-19 cases of different countries. Environmental temperature is considered as a time-varying covariate for study purposes. The plots are attractive and draw attention. The study seems interesting; however, I have some concerns related to the study.

1- In the multi-phase model, phases can be chosen in any manner. To select a phase combination, what criteria have been used?

**Answer**:

From figure (1), it can be seen that the pattern of the rate of change of Covid-19 cases is not following a smooth function over considered months. So, it is not reasonable to fit a curve for months. That’s why we chose the multiphase model. Based on AIC, BIC, TLI, RMSEA and Chi-square fitting criteria the considered model $MP\_{[3,4,5]}$ is found most suitable among the different multi-phase models.

2- In Table (1), there are typo mistakes in the caption. I think &quot; Dec, 2020 Jan, 2020 Feb, 2020 Mar, 2021 Apr, 2020 May, 2020&quot; must be replaced by &quot ;Dec, 2020 Jan, 2021 Feb, 2021 Mar, 2021 Apr, 2021 May, 2021&quot;.

**Answer**:

We have made the changes in the article as stated above.

3- What are the different coefficients in the structure plots Figure (4) and Figure (5) are showing? This needs more discussion.

**Answer**:

The coefficients in structure plots (4) and (5) show how the time-varying covariates are associated with the response variable. We restructure the paragraph in which we are discussing Figure (4) and Figure (5).

4- How different models are fitted, and coefficients are obtained reported in Table (3) and Table (4).

**Answer**:

We have used the “**lavaan**” package available in R software for analysis purposes. The package is mainly used for structural equation modeling. We write the code for the multi-phase model $MP\_{[3,4,5]}$, in which time-variant covariate is considered. By this, we get the estimated values of all the considered coefficients reported in Table (3) and Table (4).

5- Whether the temperature is related to the SARS-CoV-2 infection rate is somewhat controversial stated in the literature. The contribution of temperature to the infection trajectory was minimal if any. It is not only one factor responsible which could explain the whole change. Other factors can also be considered in the study to explain the changes and spread of Covid-19 cases.

**Answer**:

We agree with the statement that one factor can not explain the whole phenomenon. But the role of environmental temperature can’t be ignored. In favor, we have some relevant articles which state that environmental temperature plays a significant role in the growth of Covid-19 cases. Some references in support are given in the bibliography as Livadiotis, G. (2020), Malki, Z.(2020), Mandal and Panwar (2020). In our upcoming studies, we are trying to incorporate more factors for modeling purposes.

6- English of the whole paper should be checked for grammar.

**Answer**:

We try our best to make all the possible corrections with respect to the grammar.

7- As this paper can be interesting for researchers in many fields of applied mathematics. So, the authors can improve the introduction by the recent developments in this field. Also, the reference section can strengthen by including some of the following papers

1. Some Dynamic Inequalities of Hilberts Type, Journal of Function Spaces, 2020, 1-13.

2. Some Dynamic Hilbert-Type Inequalities on Time Scales, Symmetry, 2020 ,1-23.

3. Dynamic Hardy-type inequalities with non-conjugate parameters, Alexandria Engineering Journal, 2020 ,1-10.

4. Hilbert Type Inequalities For Time Scale Nabla Calculus, Advances in Difference Equations, 2020, 619,1-21.

5. Some Dynamic Hilbert-Type Inequalities For Two Variables on Time Scales, Journal of Inequalities and Applications, 2021, 31,1-21

**Answer**:

We found some of the articles quite interesting and incorporated them in the introduction section.

**Bibliography**

Livadiotis, G. (2020). Statistical analysis of the impact of environmental temperature on the exponential growth rate of cases infected by COVID-19. *PLoS one*, *15*(5), e0233875.

Malki, Z., Atlam, E. S., Hassanien, A. E., Dagnew, G., Elhosseini, M. A., & Gad, I. (2020). Association between weather data and COVID-19 pandemic predicting mortality rate: Machine learning approaches. *Chaos, Solitons & Fractals*, *138*, 110137.

Mandal, C. C., & Panwar, M. S. (2020). Can the summer temperatures reduce COVID-19 cases?. *Public health*, *185*, 72-79.