

Tentative Outline

Special Thematic Issue for the journal: Malnutrition and Coronavirus Infections

Sectional Editor: Ligen YU

- **Scope of the Thematic Issue:**

COVID-19 pandemic which is caused by the coronavirus SARS-CoV-2 virus, has claimed millions of lives worldwide in the past one and a half years. As the specific measures or drugs to stop the spread of the virus is still lacking, non-pharmacological measures like social distance and lockdown have been employed to combat this infectious disease. Coronaviruses are a family of enveloped RNA viruses, the Coronaviridae. Although intensive investigation has been carried out on coronaviruses in the past fifty years, although still, many puzzles are unsolved such as the interaction mechanism of coronavirus with the human immune system, the causal factors leading to acute respiratory disease, other multi-organ failures and patient death in severe cases. In this review, firstly we searched review articles published in the past fifty years on coronaviruses which are indexed in Clarivate Analytics Web of Science database, and carried out Bibliometrics analysis on the author keywords in these review articles to find out the possible links between various studies on coronaviruses and integrate these studies. We found that keywords like “immune system”, “immunity”, “nutrition”, “malnutrition”, “micronutrients”, “exercise”, “inflammation”, “hyperinflammation” are highly related to each other. This finding leads to the main scope of this review paper: the mutual interaction between nutrition and the immune system with the presence of coronavirus infection, and the decisive role of malnutrition (nutritional imbalance) in the pathogenesis of severe cases of COVID-19 and other coronavirus induced diseases like SARS and MERS. Special emphasis was placed on the intrinsic duality of coronaviruses and other microorganisms as an indispensable nutrition source and perpetual inflammatory agents. We then discussed some possible coping strategies to mitigate these diseases caused by coronaviruses. Also discussed the roles of other measures like vaccine and traditional medicine in alleviating the severity of the diseases.

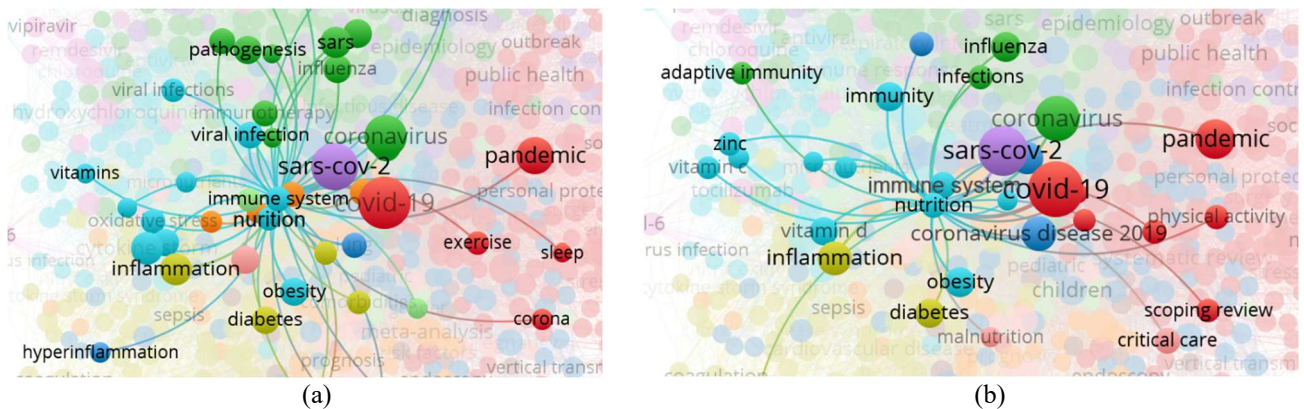


Figure 1. Author keywords analysis based on more than 14,700 review papers on coronaviruses reveals the close relationship between nutrition and the immune system in the presence of coronavirus infections.

(a) Keywords having a close link with the immune system; (b) Keywords having a close link with nutrition (A total of 20420 keywords in 14704 Review Articles, 820 keywords with occurrences ≥ 10 in the mapping)

Keywords: COVID-19; cytokine storm; immunity; inflammatory response; malnutrition; phagocytosis; restrictive eating; self-limiting infection.

References:

1. McFall-Ngai M, Hadfield MG, Bosch TCG et al (2013) Animals in a bacterial world, a new imperative for the life sciences. *Proc Natl Acad Sci USA* 110:3229-3236. DOI: 10.1073/pnas.1218525110.
2. Broderick, NA (2015) A common origin for immunity and digestion. *Frontiers in Immunology*, 6: Article No.: 72. DOI: 10.3389/fimmu.2015.00072
3. Levin BR, Antia R (2001) Why we don't get sick: The within-host population dynamics of bacterial infections. *Science*, 292:1112-1115. DOI: 10.1126/science.1058879
4. Levin BR, Baquero F, Ankomah P, McCall IC (2017) Phagocytes, Antibiotics, and Self-Limiting Bacterial Infections. *Trends in Microbiology*, 25(11):878-892. DOI: 10.1016/j.tim.2017.07.005
5. Azkur AK, Akdis M, Azkur D, Sokolowska M, van de Veen W, Brügggen MC, O'Mahony L, Gao Y, Nadeau K, Akdis CA (2020) Immune response to SARS-CoV-2 and mechanisms of immunopathological changes in COVID-19. *Allergy*, 75: 1564-1581. DOI: 10.1111/all.14364
6. Rishi P, Thakur K, Vij S, Rishi L, Singh A, Kaur IP, Patel SKS, Lee J-K, Kalia VC (2020) Diet, gut microbiota and COVID-19. *Indian J Microbiol* 60:420–429. DOI: 10.1007/s12088-020-00908-0
7. Bousquet, J., Cristol, JP., Czarlewski, W. et al. (2020) Nrf2-interacting nutrients and COVID-19: time for research to develop adaptation strategies. *Clin Transl Allergy* 10, 58. DOI: 10.1186/s13601-020-00362-7.
8. Yu, L. (2021) Restoring Good Health in Elderly with Diverse Gut Microbiome and Food Intake Restriction to Combat COVID-19. *Indian J Microbiol* 61, 104–107. DOI: 10.1007/s12088-020-00913-3
9. Saltiel AR, Olefsky JM (2017) Inflammatory mechanisms linking obesity and metabolic disease. *Journal of*

Clinical Investigation, 127(1):1-4. DOI: 10.1172/JCI92035

10. Azzolino D and Cesari M (2020) Obesity and COVID-19. *Front. Endocrinol.* 11:581356. doi: 10.3389/fendo.2020.581356
11. R. Martindale, J.J. Patel, B. Taylor, Y.M. Arabi, M. Warren, S.A. McClave (2020) Nutrition therapy in critically ill patients with coronavirus disease (COVID-19). *Journal of Parenteral and Enteral Nutrition*, 44 (7): 174-1184, DOI: 10.1002/jpen.1930
12. Saeidi A, Tayebi S M, To-aj O, Karimi N, Kamankesh S, Niazi S, et al. Physical Activity and Natural Products and Minerals in the SARS-CoV-2 Pandemic: An Update. *Ann Appl Sport Sci.* 2021; 9 (1). DOI: 10.29252/aassjournal.976
13. Nawsherwan., Khan S, Zeb F, Shoaib M, Nabi G, Haq I, Xu K, Li H. (2020) Selected Micronutrients: An Option to Boost Immunity against COVID-19 and Prevent Adverse Pregnancy Outcomes in Pregnant Women: A Narrative Review. *Iran J Public Health.* 49(11):2032-2043.
14. N Minnelli, L Gibbs, J Larrivee, KK. Sahu (2020) Challenges of maintaining optimal nutrition status in COVID-19 patients in intensive care settings. *JPEN J Parenter Enteral Nutr*, 44, pp. 1439-1446. DOI: 10.1002/jpen.1996
15. Costantini S, Sharma A and Colonna G (2011). The Value of the Cytokinome Profile, in: ***Inflammatory Diseases - A Modern Perspective***, Dr. Amit Nagal (Ed.), ISBN: 978-953-307-444-3, InTech Open.
16. Rosenberg E., Zilber-Rosenberg I. Microbes drive evolution of animals and plants: the hologenome concept. *MBio.* 2016;7(2):e01395. doi: 10.1128/mBio.01395-15.
17. Sharma M, Sudheer S, Usmani Z, Rani R, Gupta P. Deciphering the omics of plant-microbe interaction: perspectives and new insights. *Curr Genet.* 2020;21(5):343–362. doi: 10.2174/1389202921999200515140420.