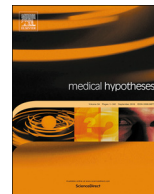




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Letter to Editors

The immunomodulatory effects of exercise against COVID-19

Dear Editor,

I found the letter by Dixit titled “Can moderate intensity aerobic exercise be an effective and valuable therapy in preventing and controlling the pandemic of COVID-19?” [1] a narrowly focused article of contemporary interest. The author overviewed the plethora of evidence on the beneficial effects of exercise, particularly debating a modality of aerobic – moderate intensity exercise – for reducing the incidence of COVID-19. While the protection offered by exercise on immune functions is well-established (e.g. URTI), system responses are dependent on multiple factors which should be cautiously pondered in a context of a potential severe acute respiratory infection and limited mobility. Although the author advocated for a certain exercise-intensity, the line of demarcation between immunoprotection and immunodepression is thin and deserves a couple of complementary observations.

On a side, whatever form of physical activity should be pursued in order to contrast the deleterious effects of sedentary behaviors, on the other hand prolonged exercise may exacerbate the susceptibility to upper respiratory tract infections, even facilitating the direct penetration of the SARS-CoV-2 to the lower airways and the alveoli during a putative COVID-19 incubation [2]. Hyperventilation of an atypical runner may exacerbate the pattern of breathing, with a potential inhalation of several agents, including the SARS-Cov-2 to deepest areas of the lungs. If infection occurs, the exercise-increased air flow could hypothetically expedite the virus diffusion to the lower airways and alveoli during the incubation period.

Second, a macro-level stress of a pandemic virus diffusion represents an unexpected social and economic burden, thus challenging mental health, inevitably. Therefore, there is a double hit on mental health conditions, given by the adjunctive offense of COVID-19 itself plus physical inactivity, with this latter possibly induced by the former one. Ultimately, immunological responses are upstream mediated by pre-existing physiological and psychological conditions.

There is a fine equilibrium within which all these factors are braided and need to be harnessed on a tailored basis, in order to maximize individual responses to the beneficial effects of exercise. The fascinating challenge will be whether we can capture the intimate mechanisms by which exercise comes to the forefront in the battle against pandemics like COVID-19.

Funding and acknowledgements

This article-letter did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

The author declares he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] Dixit S. Can moderate intensity aerobic exercise be an effective and valuable therapy in preventing and controlling the pandemic of COVID-19? *Med Hypotheses* 2020;143:109854 <https://doi.org/10.1016/j.mehy.2020.109854>.
- [2] Matricardi PM, Negro RWD, Nisini R. The first, comprehensive immunological model of COVID-19: implications for prevention, diagnosis, and public health measures. (Preprint) 2020.

Roberto Codella*

Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milan, Italy

Department of Endocrinology, Nutrition and Metabolic Diseases, IRCCS MultiMedica, Milan, Italy

E-mail address: roberto.codella@unimi.it.

* Address: Department of Biomedical Sciences for Health, Università degli Studi di Milano, Via Fratelli Cervi 93, 20090 Segrate, Milano, Italy.