

Letter to the Editor

DOI: xxx

The Role of Respiratory System Surface Area and Ventilation Volume in Severity and Mortality of COVID-19 Infection

Sepideh Tahsini Tekantapeh¹, Haleh Mikaeili¹, Hassan Soleimanpour^{2*}

1. Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

2. Emergency Medicine Research Team, Tabriz University of Medical, Tabriz, Iran.

*Corresponding author: Hassan Soleimanpour; Email: soleimanpourh@tbzmed.ac.ir

Published online: 2021-03-28

To the Editor-in-Chief:

According to epidemiologic and analytic studies of different countries during coronavirus disease 2019 (COVID-19) pandemic, high prevalence of the disease, more hospitalization, getting a more severe form of the disease, diffused peripheral distribution of opacities, more need to receiving ICU care, poor prognosis, and high mortality rate in men compared with women were obtained (1-3). The causes of the above gender differences in subsequent studies were attributed to several factors including behavioral use of masks or handwashing, as well as genetic, hormonal, and immunological factors. Also in the past epidemiologic studies, a higher prevalence of severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS) among men was shown than women. Despite the lack of accurate statistical studies, some evidence shows high severe COVID-19 incidence and mortality rate in athlete's society compared with non-athletes. Respiratory sex-related differences in women include smaller lung volumes, smaller-diameter conducting airways, smaller radial rib cage dimensions, shorter diaphragm, and fewer lung function parameters such as ventilation volume (4). Originally and typically, athletes have high lung volumes and capacities such as forced expiratory volume in 1 second (FEV1), especially high ventilation volume (5). It is well-known that in COVID-19 infection, the main route of transmission is respiratory droplets and direct

contact with infected people. Hence, this hypothesis is raised that higher lung ventilation volume ratio of men than women and athletes than non-athletes may be the major reason for the difference of COVID-19 infection based on sex. In other words, in the same condition, men expose more viral load than women, also athletes receive more viral load than non-athletes. Viral load is a critical parameter in the severity and mortality of COVID-19 infection (6). The offered hypothesis may recognize a potential approach in future studies and investigations of COVID-19 infection. Confirmation of this theory in comer studies may update health advice and improve precaution recommendations between athletes and non-athletes as well as men and women based on the surface area of the respiratory system.

ACKNOWLEDGEMENT

None.

AUTHOR CONTRIBUTION

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

CONFLICT OF INTEREST

None declared.

FUNDING

None declared.

REFERENCES

1. Krieger N, Chen JT, Waterman PD. Excess mortality in men and women in Massachusetts during the COVID-19 pandemic. *Lancet*. 2020;395(10240):1829.
2. Wenham C, Smith J, Morgan R. COVID-19: the gendered impacts of the outbreak. *Lancet* 2020;395(10227):846-8.
3. Mahmoodpoor A, Shadvar K, Ghamari AA, Mohammadzadeh Lameh M, Asghari Ardebili R, Hamidi M, et al. Management of Critically Ill Patients with COVID-19: What We Learned and What We Do. *Anesth Pain Med*. 2020;10(3):e104900.

4. LoMauro A, Aliverti A. Sex differences in respiratory function. *Breathe*. 2018;14(2):131-40.
5. Doherty M, Dimitriou L. Comparison of lung volume in Greek swimmers, land-based athletes, and sedentary controls using allometric scaling. *Br J Sports Med*. 1997;31(4):337-41.
6. Fajnzylber J, Regan J, Coxen K, Corry H, Wong C, Rosenthal A, et al. SARS-CoV-2 viral load is associated with increased disease severity and mortality. *Nat Commun*. 2020;11;5493.