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# Metabolism Clinical and Experimental

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## Letter to the Editor: Importance of metabolic health in the era of COVID-19



Dear Sir,

Since December 2019, a new virus of the coronavirus family, named SARS-COV-2, has spread throughout the world, being classified as “pandemic” and generating the so-called COVID-19. Mortality for subjects admitted to the Intensive Care Unit (ICU) is about 50% [1]. A comparison of the case-fatality rate between Italy and China, suggests that male patients aged  $\geq 70$  years are at higher risk [2]. As previously reported, subjects affected by metabolic diseases such as type 2 diabetes (T2D) or respiratory and cardiovascular diseases, including chronic obstructive pulmonary disease (COPD) or hypertension and coronary artery disease respectively, develop more severe illness [3–7]. Obesity seems the natural link between these conditions, but its prevalence in COVID-19 patients is unknown. Bhatraju et al. [1] reported that, among COVID-19 patients admitted to ICU, the mean BMI was  $33.2 \pm 7.2$  kg/m<sup>2</sup>. This is in line with evidence that obesity facilitates the infection from influenza virus [8] and it should be considered a negative prognostic factor among COVID-19 patients, as documented by a recent meta-analysis in which severe COVID-19 patients showed higher BMI compared with non-severe patients [9]. Thus, countries with higher prevalence of obesity are expected to have higher incidence of COVID-19 and complications.

In an ongoing registry from our experience in 52 (21 women and 31 men) consecutive unselected patients, the prevalence of obesity in subjects hospitalized for COVID-19 was 35%. Of them, 48% had hypertension, 13% had T2D, and 16% had COPD. Mean age was  $64 \pm 16$  years. In a multivariate logistic regression model including age, sex, T2D, hypertension, COPD, only age and gender (male) were predictors of higher mortality, but obesity was not an independent predictor of higher mortality. However, obesity was able to predict a longer length of hospital stay, indicating that obesity may lead to higher morbidity during hospitalization.

To prevent the diffusion of the virus, isolation of subjects at home has been imperative. However, staying at home decreases physical activity, and the combination of physical inactivity and increased caloric intake may further deteriorate the metabolic status of people with obesity. In this respect, telemedicine between the internist and the obese may warrant frequent control of body weight and clinical status, while avoiding unnecessary moving of the patients.

Maintaining a robust gut flora by eating a healthy, varied diet rich in fibers and fermented foods together with some degree of physical activity should be encouraged, since exercise *per se* has been linked to better immunological status [10]. To this end, free online platforms can provide videos of easy free-body training. Unfortunately, in our country no systematic preventing measures were taken in the first phase of

the COVID-19 to fight obesity, while we think that the metabolic complications of obesity were fully operating to favor COVID-19 diffusion.

Aim of this brief overview is to underline that obesity represents a risk factor for severe COVID-19. While hoping for a major attention to the problem of obesity in our countries in the future, we recommend: stay at home, stay metabolically healthy!

### Declaration of competing interest

The authors received no funding and declare no conflict of interest.

### References

- [1] Bhatraju PK, Ghassemieh BJ, Nichols M, et al. COVID-19 in critically ill patients in the Seattle region—case series. *N Engl J Med* 2020. <https://doi.org/10.1056/NEJMoa2004500>.
- [2] Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA* 2020. <https://doi.org/10.1001/jama.2020.4683>.
- [3] Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with Coronavirus Disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med* 2020. <https://doi.org/10.1001/jamainternmed.2020.0994>.
- [4] CDC COVID-19 Response Team. Preliminary estimates of the prevalence of selected underlying health conditions among patients with Coronavirus Disease 2019—United States, February 12–March 28, 2020. *MMWR* 2020;69:382–6.
- [5] Hill MA, Mantzoros C, Sowers JR. Commentary: COVID-19 in patients with diabetes. *Metabolism* 2020;24(107):154217.
- [6] Zhou J, Tan J. Diabetes patients with COVID-19 need better care. *Metabolism* 2020;107:154216. <https://doi.org/10.1016/j.metabol.2020.154216>.
- [7] Klonoff DC, Umpierrez GE. COVID-19 in patients with diabetes: risk factors that increase morbidity. *Metabolism* 2020. <https://doi.org/10.1016/j.metabol.2020.154224>.
- [8] Luzi L, Radaelli MG. Influenza and obesity: its odd relationship and the lessons for COVID-19 pandemic. *Acta Diabetol* 2020. <https://doi.org/10.1007/s00592-020-01522-8>.
- [9] Xu L, Yaqian M, Chen G. Risk factors for severe corona virus disease 2019 (COVID-19) patients: a systematic review and meta analysis. <https://doi.org/10.1101/2020.03.30.20047415>.
- [10] Wong GCL, Narang V, Yanxia L, et al. Hallmarks of improved immunological responses in the vaccination of more physically active elderly females. *Exer Immunol Rev* 2019;25:20–33.

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