

There is a Relationship Between Obesity and Coronavirus Disease 2019 but More Information is Needed

Silvio Buscemi ^{1,2}, Carola Buscemi ³, and John A. Batsis ⁴

TO THE EDITOR: We read with particular interest your comments in *Obesity* regarding the coronavirus disease 2019 (COVID-19) epidemic (1) and a related manuscript by Simonnet et al. (2). Resolution of the specific relationship between obesity and COVID-19, two existing public health epidemics, is critically needed to potentially prevent health systems worldwide from being overburdened. Few studies describing COVID-19 with rates of obesity exist, and most are based on heterogeneous populations (Table 1) (2-9). In cohort studies of COVID-19, obesity rates are generally reported as no higher than population-based estimates; in contrast, subgroups of patients with critical illness (e.g., intensive care unit [ICU] patients) report higher prevalence rates of obesity.

In Italy, no official data have been released to evaluate the prevalence of obesity in COVID-19 patients. A recent Italian report (10) failed to mention obesity as a comorbidity in admitted ICU patients with COVID-19, despite the higher rates of obesity in severe disease (including ICU admission) in non-Italian studies (Table 1). Although correlation does not imply a causal relationship, as other factors may indeed play a role in the heterogeneity of the sampled population, the incidence of COVID-19 in each Italian region is surprisingly inversely related to the regional prevalence of obesity ($r = -0.76$; $P < 0.001$) (Figure 1). Yet Italian data demonstrated high obesity rates (~71%) only among younger patients (<40 years) dying of COVID-19 in this small subgroup of 49 patients. Such

data suggest that in Italy, obesity may have a greater impact at a younger age, which is consistent with data from ICU cohorts without COVID-19. In fact, it also was reported (5) that the risk of ICU admission for patients with obesity is higher at younger ages (<60 years old). We cautiously speculate that the higher obesity rates (>75%) in ICU-based patients with COVID-19 as reported by Simonnet et al. (2) may depend on the relatively young age of their cohort (median age of 60 years). These authors also observed an increased risk of mechanical ventilation in patients with class II obesity. Rates of critical illness in patients with COVID-19 and obesity are higher than those reported for ICU patients with obesity (~20%) (11). Although lower mortality rates have been reported in patients with BMI ≥ 25 kg/m² in ICU settings (11,12), additional data are lacking in ICU-based COVID-19 with obesity. Despite many limitations, data reported in Table 1 distinguish among obesity, diabetes, and hypertension, which further supports the importance of obesity in this illness.

In conclusion, obesity strongly impacts the severity of COVID-19, yet it behooves clinicians and researchers to recognize the heterogeneous nature of the existing cohort data. This study furthers our understanding of the obesity/COVID-19 relationship. There are important, unresolved questions related to the impact of body composition (fat/fat-free muscle), relevant coexisting comorbid conditions, severity of disease, and predictors of important outcomes such as hospitalization and mortality in this population. **O**

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¹ Unit of Clinical Nutrition, Policlinico University Hospital, Palermo, Italy. Correspondence: Silvio Buscemi (silvio.buscemi@unipa.it) ² Department of Health Promotion, Mother and Child Care, Internal Medicine and Medical Specialties, University of Palermo, Palermo, Italy ³ Department of Clinical and Experimental Medicine, Postgraduate Program in Geriatrics, School of Medicine, University of Catania, Catania, Italy ⁴ Section of General Internal Medicine, Geisel School of Medicine, Dartmouth-Hitchcock Medical Center, The Dartmouth Institute for Health Policy & Clinical Practice, Lebanon, New Hampshire, USA.

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TABLE 1 Obesity and COVID-19

Source	Obesity prevalence (%)			Age (y)	Notes
	Nation	General population	Patients with COVID-19		
McMichael et al. (3)	USA	42.4	22.2	72 (range: 21-100)	Inpatients (n = 101), health care personnel (n = 50), visitors (n = 16)
Richardson et al. (4)	USA	42.4	41.7	63 (IQR: 52-75)	n = 4,170 hospitalized patients with and without critical illness
Centers for Disease Control and Prevention (8)	USA	42.4	53.2	>18	n = 415 hospitalized patients with and without critical illness
European Centre for Disease Prevention and Control (9) ^a	Europe	20 (male), 23 (female)	73.4	>18	ICU patients with critical illness
Lighter J et al. (5) ^b	USA	42.4	37	>18	n = 3,615 patients with and without critical illness
			46.8	>18	n = 431 ICU patients with critical illness
			41.1	>18	n = 547 acute care patients
Goyal et al. (6)	USA	42.4	35.8	62 (49-74)	n = 393, patients with critical illness on IMV and patients without critical illness
			43.4	65	n = 130 ICU patients with critical illness
			31.9	62	n = 263 acute care patients
Istituto Superiore Sanità (13)	Italy	9.8	71.4	18-40	n = 49 young patient deaths as of April 16, 2020
			11.8	>18	n = 19,996 ^c patient deaths as of April 16, 2020
Simonnet et al. (2) ^d	France	15	75.8 ^e	60 (IQR 51-70)	n = 124 ICU patients with critical illness
Qingxian et al. (7) ^f	China	17.8	10.7 (BMI ≥ 28)	48 (IQR 39-54)	n = 383 patients with and without critical illness

^aData reported for Italy, Spain, Sweden, Switzerland, and the Netherlands.

^bRisk of acute or ICU admission for patients with obesity: ≥60 years old (odds ratios, 0.9 and 1.5; P = nonsignificant); <60 years old (odds ratios, 1.8 and 3.6; P < 0.001)

^c12.6% of all cases in Italy.

^dRisk of IMV for patients with BMI > 35: odds ratio, 7.36 (P = 0.021).

^eVersus 25.8% for ICU patients without COVID-19.

^fRisk of progression to severe pneumonia for patients with obesity: odds ratio, 3.4 (P = 0.006).

COVID-19, coronavirus disease 2019; ICU, intensive care unit; IMV, invasive mechanical ventilation; IQR, interquartile range.

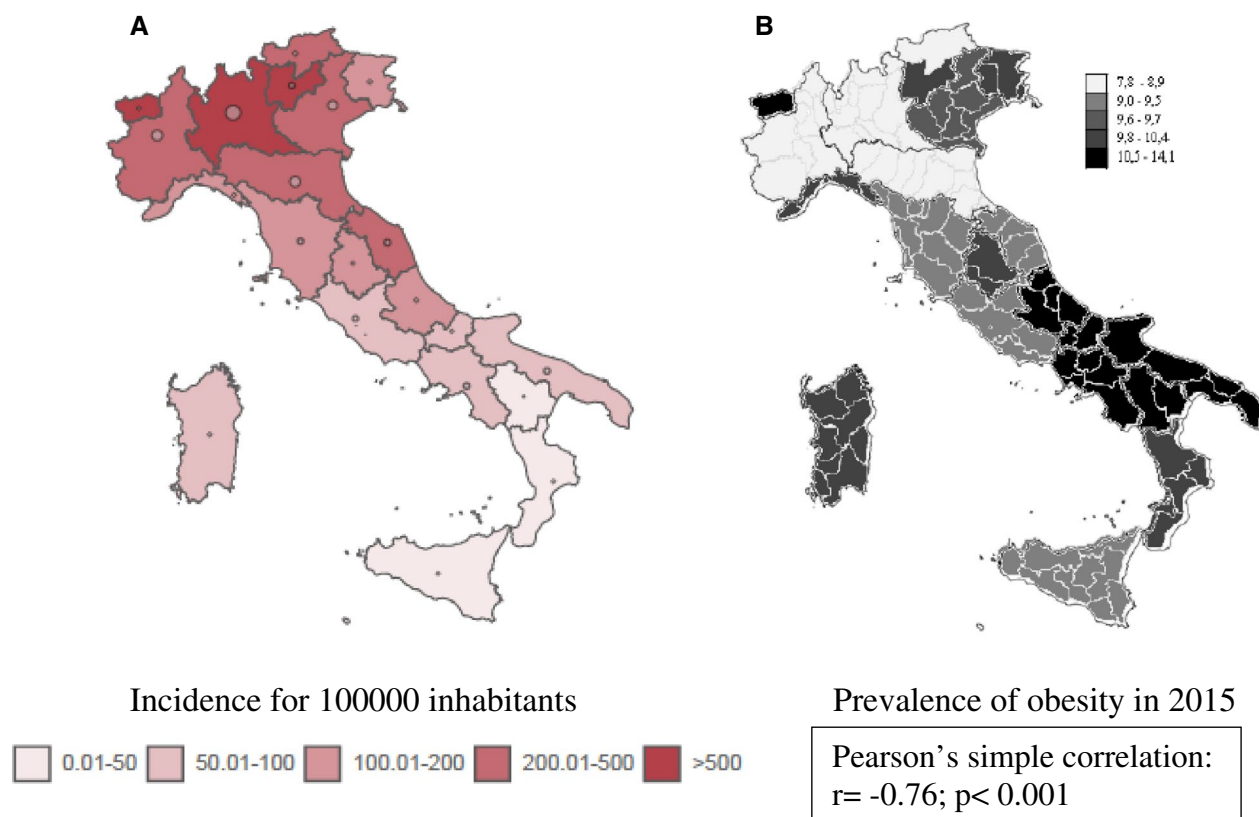


Figure 1 (A) Incidence of coronavirus 2019 disease (COVID-19) in Italy as of April 16, 2020, and (B) prevalence of overweight and obesity. Data are from the Istituto Superiore di Sanità, Rome, Italy (13), and Istat (14). [Color figure can be viewed at wileyonlinelibrary.com]