

DR. ARI MANUEL (Orcid ID : 0000-0002-7092-1687)

Article type : Letter to the Editor

6th April 2020

Does COVID-19 Disprove the Obesity Paradox in ARDS?

Ricardo J. Jose and Ari Manuel

Ricardo J Jose^{1,2}, Ari Manuel³

¹Respiratory Medicine (Host Defence), Royal Brompton Hospital, Sydney street, Chelsea, SW36NP

²Centre for Inflammation and Tissue Repair, UCL Respiratory, 5 University Street, London, WC1E6JF

³University Hospital Aintree, Longmoor Lane, Liverpool, L97AL

Corresponding author:

Dr Ari Manuel, University of Liverpool, University Hospital Aintree, Longmoor Lane, Liverpool, L97AL

Email: ari.manuel@liverpool.ac.uk

Disclosure: The authors declare no conflict of interest

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1002/oby.22835](https://doi.org/10.1002/oby.22835)

This article is protected by copyright. All rights reserved

In reference to COVID 19 and the Patient with Obesity – The Editors Speak Out: Ryan et al 1st
April 2020 Obesity

Obesity is associated with a decrease in mortality in patients with Adult Respiratory Distress Syndrome (ARDS) and is referred to as the obesity paradox.¹ ARDS is a type of respiratory failure characterised by rapid onset of widespread inflammation in the lungs and is usually the result of infectious or chemical injury. The obesity paradox in ARDS patients has been investigated by Ni et al,¹ who conclude that obesity and morbid obesity were associated with a lower mortality rate in patients with ARDS

One pathophysiological mechanism postulated to explain the decreased mortality in obese critically ill patients is pre-conditioning - a chronic pro-inflammatory status in obesity which creates a protective environment, limiting the detrimental effects of a more aggressive second hit, such as ventilator-induced lung injury or sepsis.²

A number of studies have identified a higher body mass index (BMI) as a risk factor for severe disease in patients with COVID-19. Peng et al³ conducted a retrospective analysis on 112 COVID-19 patients with cardiovascular disease in Wuhan. The BMI of the ICU group was significantly higher than that of the general hospital admissions group (25.5 (23.0, 27.5) kg/m² vs. 22.0 (20.0, 24.0) kg/m², p=0.003). Patients were further divided into a non-survivor group (n=17) and survivor group (n=95). Among the non-survivors, there were 88.2% (15/17) patients with BMI > 25 kg/m², which was significantly higher than that of survivors (18.9% (18/95), P<0.001).

Wu⁴ found that a severe COVID-19 group had significantly higher mean BMI values than the group of patients with mild disease (25.8 ± 1.8 vs. 23.6 ± 3.2, P = 0.005).

What could be causing the apparent difference in severity of COVID-19 in patients with obesity, compared to previous studies of ARDS in patients with obesity? Clinicians tend to consider patients with obesity at higher risk of worse outcome; thus, this might result in earlier admission

to the ICU for monitoring purposes, in normal circumstances⁵. In this current pandemic, clinicians are not afforded this luxury.

Patients with obesity have reduced chest wall elastance and lower total respiratory system compliance with a decrease expiratory reserve volume. Difficult airway management, as well as this altered lung and chest wall physiology in combination with positional gas trapping are routinely encountered in patients with obesity⁵.

Proning appears to be critical to success in ARDS, which is likely to be difficult in patients with obesity, due to a staff and equipment shortages in this pandemic situation. Furthermore, right ventricular (RV)⁶ dysfunction seems to be an issue in patients with COVID-19, and patients with obesity may be at increased risk due to impaired RV contraction due to higher circulating plasma volume, increased sympathetic nervous system activation and metabolic dysregulation driving higher filling pressures.

We do not know whether the obesity paradox has been broken by Covid-19. Obese patients may be less affected by aspects of Covid-19, harder to treat due to obesity-related factors and at greater risk due to obesity-related vulnerabilities. Taken together, these elements may contribute to difficulties for obese patients in accessing care during a pandemic if they are wrongly perceived by clinicians, policymakers to be at higher risk of worse outcomes

References

1. Ni Y-N, Luo J, Yu H, Wang Y-W, Hu Y-H, Liu D, et al. Can body mass index predict clinical outcomes for patients with acute lung injury/acute respiratory distress syndrome? A meta-analysis. *Crit Care Lond Engl.* 2017;21:36.
2. Bustamante AF. Adipose-lung cell crosstalk in the obesity-ARDS paradox. *J Pulm Respir Med.* 2013;3:144
3. Peng YD, Meng K, Guan HQ, Leng L, Zhu RR, Wang BY, He MA, Cheng LX, Huang K, Zeng QT. [Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV]. *Zhonghua Xin Xue Guan Bing Za Zhi.* 2020 Mar2;48(0):E004
4. Wu J, Li W, Shi X, Chen Z, Jiang B, Liu J, Wang D, Liu C, Meng Y, Cui L, Yu J, Cao H, Li L. Early antiviral treatment contributes to alleviate the severity and improve the prognosis of patients with novel coronavirus disease (COVID-19). *J Intern Med.* 2020 Mar 27
5. Pelosi P, Gregoretti C. Perioperative management of obese patients. *Best Pract Res Clin Anaesthesiol.* 2010;24:211–25
6. Luigi Camporata ESCIM seminar April 2nd 2020