



Early View

Correspondence

Cardiovascular comorbidity and its impact on patients with Covid-19

Wei-jie Guan, Wen-hua Liang, Jian-xing He, Nan-shan Zhong

Please cite this article as: Guan W-jie, Liang W-hua, He J-xing, *et al.* Cardiovascular comorbidity and its impact on patients with Covid-19. *Eur Respir J* 2020; in press (<https://doi.org/10.1183/13993003.01227-2020>).

This manuscript has recently been accepted for publication in the *European Respiratory Journal*. It is published here in its accepted form prior to copyediting and typesetting by our production team. After these production processes are complete and the authors have approved the resulting proofs, the article will move to the latest issue of the ERJ online.

Copyright ©ERS 2020. This article is open access and distributed under the terms of the Creative Commons Attribution Non-Commercial Licence 4.0.

Correspondence

Cardiovascular comorbidity and its impact on patients with Covid-19

Wei-jie Guan^{1,#}, Ph.D., Wen-hua Liang^{2,#}, M.D., Jian-xing He^{2,*}, M.D., Nan-shan Zhong^{1,*}, M.D.

¹ State Key Laboratory of Respiratory Disease & National Clinical Research Center for Respiratory Disease, the First Affiliated Hospital of Guangzhou Medical University, Guangzhou Medical University, Guangzhou, China

² Department of Thoracic Oncology and Surgery, China State Key Laboratory of Respiratory Disease & National Clinical Research Center for Respiratory Disease, the First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China.

Wei-jie Guan and Wen-hua Liang are joint first authors.

Correspondence to:

Jian-xing He MD, PhD, FACS, FRCS, AATS active member, ESTS member. Department of Thoracic Surgery, the First Affiliated Hospital of Guangzhou Medical University; China State Key Laboratory of Respiratory Disease & National Clinical Research Center for Respiratory Disease, Guangzhou, China. Tel: +86-20-8337792; Fax: +86-20-83350363; Email: drjianxing.he@gmail.com;

Nan-Shan Zhong. State Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, 151 Yanjiang Road, Guangzhou, Guangdong, China. Tel.: +86-20-83062729; Fax: +86-20-83062729; E-mail: nanshan@vip.163.com

Conflict of interest: There is no conflict of interest.

FUNDING: Supported by National Health Commission, Department of Science and Technology of Guangdong Province. The funder had no role in the conduct of the study.

Key words: Hypertension; coronary heart disease; clinical outcomes

Short title: Hypertension and Covid-19

Author's contributions: W. J. G. and W. H. L. drafted the manuscript; all authors provided critical review of the manuscript and approved the final draft for publication.

Take-home message: Comorbid hypertension correlates with poorer outcomes in patients with Covid-19.

To the editors

We truly appreciate the comments from Sisnieguez et al., who have performed a further analysis on the potential association between cardiovascular comorbidities and the clinical outcomes of Covid-19 (in particular, the mortality) [1]. We also applaud the suggestion to thoroughly adjust for the potential confounding factors when interpreting the association between specific categories of cardiovascular comorbidities (e.g., hypertension) and the clinical outcomes of Covid-19. To this end, we have attempted to incorporate the cardiovascular diseases (including coronary heart disease) into the multivariate regression model [2]. Findings of the model indicated a prominent collinearity between hypertension and coronary heart disease, and we have therefore elected to retain hypertension in the regression model for further analyses.

Like other comorbidities such as chronic obstructive pulmonary disease, the record of cardiovascular comorbidities was derived from the patient's self-report, which could not preclude under-reporting. Therefore, the percentage of patients with cardiovascular diseases might have been underestimated given the urgency of data collection (history taking) within the wards during the outbreak. Our findings could have also been attributed to the relatively low proportion of patients with co-existing hypertension and coronary heart disease in our study. Nonetheless, the overall proportion of patients with comorbidities in our study [2] was

in keeping with the previous publications [3-7]. Our findings were likely to be generalizable to other population worldwide.

The causes for the association between cardiovascular diseases and the poor clinical outcomes of Covid-19 might be multifaceted, including but not limited to the interaction with the age, and the cardiac dysfunction due to viral infections. Since our study was a cross-sectional case study, causality could not be inferred from the current study design. Dynamic monitoring of the cardiovascular symptoms, the cardiac function, and the laboratory markers might help unravel the underlying pathways linking cardiovascular diseases to the poor clinical outcomes of Covid-19.

Reference

1. Leiva Sisniegues CE, Espeche WG, Salazar MR. Arterial hypertension and the risk of severity and mortality of COVID-19. *Eur Respir J*. 2020 (article in press)
2. Guan WJ, Liang WH, Zhao Y, et al. Comorbidity and its impact on 1590 patients with Covid-19 in China: A Nationwide Analysis. *Eur Respir J*. 2020 Mar 26. pii: 2000547
3. Placzek HED, Madoff LC. Association of age and comorbidity on 2009 influenza A pandemic H1N1-related intensive care unit stay in Massachusetts. *Am J Public Health*. 2014;104:e118-e125
4. Booth CM, Matukas LM, Tomlinson GA, et al. Clinical features and short-term outcomes of 144 patients with SARS in the greater Toronto area. *JAMA*. 2003;289:2801-2809
5. Alqahtani FY, Aleanizy FS, Ali Hadi Mohammed R, et al. Prevalence of comorbidities in cases of Middle East respiratory syndrome coronavirus: a retrospective study. *Epidemiol*

Infect. 2018;5:1-5

6. Badawi A, Ryoo SG. Prevalence of comorbidities in the Middle East respiratory syndrome coronavirus (MERS-CoV). *Int J Infect Dis.* 2016;49:129-133

7. Alanazi KH, Abedi GR, Midgley CM, et al. Diabetes Mellitus, Hypertension, and Death among 32 Patients with MERS-CoV Infection, Saudi Arabia. *Emerging Infect Dis.* 2020;26:166-168