



Editorial

COVID-19 and Chagas disease in Latin America

COVID-19 y Enfermedad de Chagas en América Latina

Alfonso J. Rodriguez-Morales^{1,2,3,a*}, Luccio Romani^{4,5,b},
Darwin A. León-Figueroa^{4,5,b}

DOI

<https://doi.org/10.35434/rcmhnaaa.2022.152.1499>

The Coronavirus Disease 2019 (COVID-19), caused by severe acute respiratory syndrome type 2 coronavirus (SARS-CoV-2), have compromised multiple implications in regional epidemiological problems^[1-4]. For example, in Latin America, COVID-19 was first reported in a 61-year-old man from Italy in Brazil on February 26, 2020^[5,6]. As a result, more than 68.294.000 documented infections and 1.682.000 deaths are reported in Latin America and the Caribbean^[7].

Fifteen per cent of patients with COVID-19 develop severe clinical symptoms requiring oxygen support, and 5% develop a critical condition accompanied by respiratory failure, acute respiratory distress syndrome, septic shock and sepsis, thromboembolism, and multiorgan failure, including acute renal and cardiac injury^[8]. Some risk factors for presenting the severe form of COVID-19 described in the literature are advanced age, smoking, hypertension, diabetes, heart disease, chronic lung disease, and cancer^[9,10].

Chagas disease, first described in Latin America (Brazil) in 1909 by Carlos Chagas, is a parasitic infection caused by *Trypanosoma cruzi*, transmitted mainly by the *Triatoma*, a hematophagous arthropod of the Reduviidae family^[11-15].

Chagas Disease has a high morbimortality rate and a substantial social impact, emerging as an essential threat to public health, affecting millions of people worldwide, causing approximately 50,000 deaths^[16,17].

Chagas Disease is endemic in much of Latin America, causing mainly cardiac and gastrointestinal complications, which could increase susceptibility to COVID-19 in infected patients^[18,19].

Chagas Disease presents two distinct clinical phases: an acute phase, associated with a strong type 1 immune response, and a chronic phase, which can last for the rest of the patient's life. The chronic phase can progress to varying degrees of severity in 30% of cases, leading to dilated cardiomyopathy, arrhythmia, cardioembolism, heart failure, and death^[11].

Cardiac manifestations of Chagas Disease include generalized hypertrophy and dilatation and mural thrombus commonly seen in the right atrium and apex of the left ventricle. In addition, microscopically, it will show chronic fibrosis, focal area of necrosis and granular degeneration, and interfibrillar oedema^[20].

The cardiac damage produced by Chagas Disease has a similar presentation to SARS-CoV-2 infection, causing myocardial dysfunction and damage, endothelial dysfunction, microvascular dysfunction, plaque instability, and myocardial infarction^[21,22]. The cardiac damage produced by COVID-19 is a combination of direct viral injury and cardiac damage due to the host immune response^[23].

Further depression of ventricular function by COVID-19 caused by myocardial infarction and microvascular dysfunction is also found in *T. cruzi* infection^[21]. In

FILIACIÓN

1. Grupo de Investigación Biomedicina, Faculty of Medicine, Fundación Universitaria Autónoma de las Américas, Pereira, Risaralda, Colombia.
 2. Institución Universitaria Visión de las Américas, Pereira, Risaralda, Colombia.
 3. Master of Clinical Epidemiology and Biostatistics, Universidad Científica del Sur, Lima, Perú.
 4. Universidad de San Martín de Porres, Facultad de Medicina Humana, Chiclayo, Perú.
 5. Emerge, Unidad de Investigación en Enfermedades Emergentes y Cambio Climático, Facultad de Salud Pública y Administración, Universidad Peruana Cayetano Heredia. Lima, Perú..
- a. Médico Tropicalista, Doctor Honoris Causa
b. Estudiante de medicina

ORCID:

1. Alfonso J. Rodriguez-Morales
[0000-0001-9773-2192](https://orcid.org/0000-0001-9773-2192)
2. Luccio Romani
[0000-0003-1641-5537](https://orcid.org/0000-0003-1641-5537)
3. Darwin A. León-Figueroa
[0000-0001-7267-0204](https://orcid.org/0000-0001-7267-0204)

CORRESPONDENCIA

Alfonso J. Rodriguez-Morales

EMAIL

alfonso.rodriguez@uam.edu.co

CONFLICTOS DE INTERÉS

Los autores, niegan conflictos de interés

COMO CITAR

Rodriguez-Morales AJ, Romani L, León-Figueroa DA. COVID-19 y Enfermedad de Chagas en América Latina. Rev. Cuerpo Med. HNAAA [Internet]. 10 de junio de 2022 [citado 10 de junio de 2022];15(2). DOI: <https://doi.org/10.35434/rcmhnaaa.2022.152.1499>



Esta obra está bajo una Licencia Creative Commons Atribución 4.0 Internacional.
Versión Impresa: ISSN: 2225-5109
Versión Electrónica: ISSN: 2227-4731
Cross Ref. DOI: 10.35434/rcmhnaaa
OJS: <https://cmhnaaa.org.pe/ojs>

addition, COVID-19 may predispose patients to thrombotic disease^[24]. Increased procoagulant activity has been reported in the plasma of patients with chronic Chagas Disease^[25].

During the chronic phase of Chagas Disease, immunosuppression due to treatment and the disease itself leads to a high risk of Chagas Disease reactivation^[26,27]. For example, during COVID-19 presentation, cytokine storm, treatment with steroids and immunomodulators, and SARS-CoV-2 can trigger Chagas Disease reactivation, directly influencing the parasite and the host^[28-30].

Given the above, the spread of the COVID-19 pandemic in Latin America is of concern due to several reasons: the population infected with *T. cruzi* in our region, the burden of comorbidities, the socioeconomic vulnerability affecting Latin America, and the presence of saturated and weakened health systems due to the pandemic^[31].

Cases of Chagas Disease and COVID-19 co-infection have begun to be reported in Latin America. Most of these are in Brazil. The reports report cases of patients with chronic Chagas Disease infection with rapid disease progression to death from COVID-19^[5,11,32]. That could be due to both diseases' myocardial involvement, as previously explained. Therefore, it should be considered a risk factor for complications and unfavourable prognosis in patients with co-infection, especially in Chagas Disease patients with cardiomyopathy.

A study conducted in Brazil that compared the progression of COVID-19 between patients with chronic Chagas Disease and those without the disease reported a significantly superior difference in patients with chronic Chagas Disease concerning the prevalence of chronic heart failure (8 [25.8%] vs 12 [9.7%]; $p = 0.031$) and atrial fibrillation (9 [29.0%] vs 7 [5.6%]; $p < 0.001$). He also reported that patients with Chagas Disease more frequently presented pleural effusion on follow-up computed tomography^[32].

CHD affects many socially vulnerable populations, including population groups with a high burden of CHD among their inhabitants, presenting particular challenges in access to health services^[33]. In addition, low-income people are especially vulnerable to the economic impact of the pandemic, worsening access to health care.

The pandemic has led many people to generate feelings against going to hospitals, which could be detrimental to people vulnerable to *T. cruzi* infection and people living in Chagas Disease endemic areas^[34]. Likewise, Chagas Disease could generate a higher level of concern in patients, more accentuated in patients with co-infection, and could generate high levels of worry and stress^[18].

Although the indications for screening and diagnosis of Chagas Disease have not changed during the pandemic, actions for prevention, control, and care of neglected diseases, including Chagas Disease, were interrupted in many regional countries for various periods, mainly routine vector control actions^[35,36]. The number of studies regarding Chagas Disease and COVID-19 is limited in Latin America, deserving more research^[37,38]. With the expansion from rural to urban areas, this is also relevant^[39]. It is also important to

remember that patients with the indeterminate chronic form of Chagas Disease had a significant annual risk of developing cardiomyopathy. The annual risk was more than double among patients in the acute phase of *T. cruzi* infection^[40].

Finally, the COVID-19 pandemic is far from over in the region; there is still much to be understood not only at the epidemiological and clinical level but also in its pathophysiology and immune response, which includes the interaction with the *T. cruzi* virus and other pathogens, with which there may be co-infections and aggravate the patient's disease^[36]. Certainly, also would be important to assess the impact of cardiovascular long-COVID-19 and their implications among patients with Chagas Disease.

REFERENCIAS BIBLIOGRÁFICAS

- Mohamadian M, Chiti H, Shoghli A, Biglari S, Parsamanesh N, Esmailzadeh A. COVID-19: Virology, biology and novel laboratory diagnosis. *The Journal of Gene Medicine* 2021;23. <https://doi.org/10.1002/JGM.3303>.
- Prabhakaran D, Perel P, Roy A, Singh K, Raspail L, Faria-Neto JR, et al. Management of Cardiovascular Disease Patients With Confirmed or Suspected COVID-19 in Limited Resource Settings. *Global Heart* 2020;15:44. <https://doi.org/10.5334/GH.823>.
- Sliwa K, Singh K, Raspail L, Ojji D, Lam CSP, Thienemann F, et al. The World Heart Federation Global Study on COVID-19 and Cardiovascular Disease. *Global Heart* 2021;16. <https://doi.org/10.5334/GH.950>.
- Głuchowska K, Dzieciatkowski T, Sędzikowska A, Zawistowska-deniziak A, Młocicki D. The New Status of Parasitic Diseases in the COVID-19 Pandemic—Risk Factors or Protective Agents? *Journal of Clinical Medicine* 2021;10:2533. <https://doi.org/10.3390/JCM10112533>.
- Kurizky PS, Cerqueira SRPS, Cunha DV, Albuquerque CP de, Aires RB, Mota LMH da, et al. The challenge of concomitant infections in the coronavirus disease 2019 pandemic era: Severe acute respiratory syndrome coronavirus 2 infection in a patient with chronic Chagas disease and dimorphic leprosy. *Revista Da Sociedade Brasileira de Medicina Tropical* 2020;53:e20200504. <https://doi.org/10.1590/0037-8682-0504-2020>.
- Coronavirus: Brasil confirma el primer caso en América Latina - BBC News Mundo n.d. <https://www.bbc.com/mundo/noticias-america-latina-51641436> (accessed January 28, 2022).
- REUTERS-COVID-19 TRACKER. América Latina y el Caribe: los datos, gráficos y mapas más recientes sobre el coronavirus n.d. <https://graphics.reuters.com/world-coronavirus-tracker-and-maps/es/regions/latin-america-and-the-caribbean/> (accessed January 28, 2022).
- Team TNCPERE. The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) – China, 2020. *China CDC Weekly* 2020;2:113.
- Alqahtani JS, Oyelade T, Aldhahir AM, Alghamdi SM, Almeahmadi M, Alqahtani AS, et al. Prevalence, Severity and Mortality associated with COPD and Smoking in patients with COVID-19: A Rapid Systematic Review and Meta-Analysis. *PLoS ONE* 2020;15. <https://doi.org/10.1371/JOURNAL.PONE.0233147>.
- WHO. WHO statement: Tobacco use and COVID-19 2020. <https://www.who.int/news/item/11-05-2020-who-statement-tobacco-use-and-covid-19> (accessed January 28, 2022).
- Alberca RW, Yendo TM, Ramos YAL, Fernandes IG, de Mendonça Oliveira L, Teixeira FME, et al. Case Report: COVID-19 and Chagas Disease in Two Coinfected Patients. *The American Journal of Tropical Medicine and Hygiene* 2020;103:2353. <https://doi.org/10.4269/AJTMH.20-1185>.
- Ferreira LLG, Andricopulo AD. World Chagas Disease Day and the New Road Map for Neglected Tropical Diseases. *Current Topics in Medicinal Chemistry* 2020;20:1518-20. <https://doi.org/10.2174/156802662017200624115305>.
- Schultz J, Hyson P, Chastain DB, Gharamti AA, Franco-Paredes C, Henaó-Martínez AF. COVID-19 epidemic in the US—A gateway to screen for tuberculosis, HIV, viral hepatitis, Chagas disease, and other neglected tropical diseases among Hispanics. *PLoS Neglected Tropical Diseases* 2020;14:1-6.

- <https://doi.org/10.1371/JOURNAL.PNTD.0008953>.
14. Queiroz AMV, Oliveira JW de F, Moreno CJ, Guérin DMA, Silva MS. VLP-Based Vaccines as a Suitable Technology to Target Trypanosomatid Diseases. *Vaccines* 2021; 9: 1-9. <https://doi.org/10.3390/VACCINES9030220>.
 15. dos Santos Ramos MA, dos Santos KC, da Silva PB, de Toledo LG, Marena GD, Rodero CF, et al. Nanotechnological strategies for systemic microbial infections treatment: A review. *International Journal of Pharmaceutics* 2020; 589: 119780. <https://doi.org/10.1016/J.IJPHARM.2020.119780>.
 16. Lidani KCF, Andrade FA, Bavia L, Damasceno FS, Beltrame MH, Messias-Reason IJ, et al. Chagas Disease: From Discovery to a Worldwide Health Problem. *Frontiers in Public Health* 2019;7. <https://doi.org/10.3389/FPUBH.2019.00166>.
 17. Parra-Henao G, Coelho G, Escobar JP, Gonzalvez G, Bezerra H. Beyond the traditional vector control and the need the strengthening integrated vector management in Latin America. *Therapeutic Advances in Infectious Disease* 2021; 8. <https://doi.org/10.1177/2049936121997655>.
 18. Zaidel EJ, Forsyth CJ, Novick G, Marcus R, Ribeiro ALP, Pinazo MJ, et al. COVID-19: Implications for People with Chagas Disease. *Global Heart* 2020;15. <https://doi.org/10.5334/GH.891>.
 19. Diaz-Hernandez A, Gonzalez-Vazquez MC, Arce-Fonseca M, Rodriguez-Morales O, Cedillo-Ramirez ML, Carabarin-Lima A. Risk of COVID-19 in Chagas Disease Patients: What Happen with Cardiac Affections? *Biology* 2021; 10. <https://doi.org/10.3390/BIOLOGY10050411>.
 20. Nguyen T, Waseem M. Chagas Disease. *Medicina Interna de Mexico* 2021;34:959-70. <https://doi.org/10.24245/mim.v34i6.2217>.
 21. Guzik TJ, Mohiddin SA, Dimarco A, Patel V, Savvatis K, Marelli-Berg FM, et al. COVID-19 and the cardiovascular system: implications for risk assessment, diagnosis, and treatment options. *Cardiovascular Research* 2020; 116: 1666-87. <https://doi.org/10.1093/CVR/CVAA106>.
 22. Schett G, Sticherting M, Neurath MF. COVID-19: risk for cytokine targeting in chronic inflammatory diseases? *Nature Reviews Immunology* 2020; 20: 520-7. <https://doi.org/10.1038/s41577-020-0312-7>.
 23. Siripanthong B, Nazarian S, Muser D, Deo R, Santangeli P, Khanji MY, et al. Recognizing COVID-19-related myocarditis: The possible pathophysiology and proposed guideline for diagnosis and management. *Heart Rhythm* 2020; 17: 1463-71. <https://doi.org/10.1016/J.HRTHM.2020.05.001/ATTACHMENT/D04E6C5F-E728-4773-8ADB-61EF841E4606/MMC1.DOCX>.
 24. Bikdeli B, Madhavan Mv., Jimenez D, Chuich T, Dreyfus I, Driggin E, et al. COVID-19 and Thrombotic or Thromboembolic Disease: Implications for Prevention, Antithrombotic Therapy, and Follow-Up: JACC State-of-the-Art Review. *Journal of the American College of Cardiology* 2020; 75: 2950-73. <https://doi.org/10.1016/J.JACC.2020.04.031>.
 25. Pinazo MJ, Posada E de J, Izquierdo L, Tassies D, Marques AF, de Lazzari E, et al. Altered Hypercoagulability Factors in Patients with Chronic Chagas Disease: Potential Biomarkers of Therapeutic Response. *PLOS Neglected Tropical Diseases* 2016;10:e0004269. <https://doi.org/10.1371/JOURNAL.PNTD.0004269>.
 26. Rassi A, Neto VA, de Siqueira AF, Ferrioli Filho F, Amato VS, Rassi A. J. Efeito protetor do benznidazol contra a reativação parasitária em pacientes cronicamente infectados pelo Trypanosoma cruzi e tratados com corticóide em virtude de afecções associadas. *Revista Da Sociedade Brasileira de Medicina Tropical* 1999;32:475-82. <https://doi.org/10.1590/S0037-86821999000500002>.
 27. dos Santos-Neto LL, Polcheira MF, Castro C, Corrêa Lima RA, Kozak Simaan C, Corrêa-Lima FA. Alta parasitemia pelo Trypanosoma cruzi em paciente com lupus eritematoso sistêmico. *Revista Da Sociedade Brasileira de Medicina Tropical* 2003;36:613-5. <https://doi.org/10.1590/S0037-86822003000500012>.
 28. Keating SM, Deng X, Fernandes F, Cunha-Neto E, Ribeiro AL, Adesina B, et al. Inflammatory and cardiac biomarkers are differentially expressed in clinical stages of Chagas disease. *International Journal of Cardiology* 2015; 199: 451-9. <https://doi.org/10.1016/J.IJCARD.2015.07.040>.
 29. López L, Arai K, Giménez E, Jiménez M, Pascuzo C, Rodríguez-Bonfante C, et al. C-Reactive Protein and Interleukin-6 Serum Levels Increase as Chagas Disease Progresses Towards Cardiac Failure. *Revista Española de Cardiología (English Edition)* 2006;59:50-6. [https://doi.org/10.1016/S1885-5857\(06\)60048-0](https://doi.org/10.1016/S1885-5857(06)60048-0).
 30. Echeverría LE, Marcus R, Novick G, Sosa-Estani S, Ralston K, Zaidel EJ, et al. WHF IASC roadmap on chagas disease. *Global Heart* 2020;15. <https://doi.org/10.5334/GH.484/METRICS/>.
 31. Manne-Goehler J, Umeh CA, Montgomery SP, Wirtz VJ. Estimating the Burden of Chagas Disease in the United States. *PLOS Neglected Tropical Diseases* 2016; 10: e0005033. <https://doi.org/10.1371/JOURNAL.PNTD.0005033>.
 32. Molina I, Marcolino MS, Pires MC, Ramos LEF, Silva RT, Guimarães-Júnior MH, et al. Chagas disease and SARS-CoV-2 coinfection does not lead to worse in-hospital outcomes. *Scientific Reports* 2021;11. <https://doi.org/10.1038/s41598-021-96825-3>.
 33. Viotti R, Vigliano CA, Álvarez MG, Lococo BE, Petti MA, Bertocchi GL, et al. The Impact of Socioeconomic Conditions on Chronic Chagas Disease Progression. *Revista Española de Cardiología (English Edition)* 2009;62:1224-32. [https://doi.org/10.1016/S1885-5857\(09\)73349-3](https://doi.org/10.1016/S1885-5857(09)73349-3).
 34. Pessoa-Amorim G, Camm CF, Gajendragadkar P, Maria GL de, Arsac C, Laroche C, et al. Admission of patients with STEMI since the outbreak of the COVID-19 pandemic: a survey by the European Society of Cardiology. *European Heart Journal - Quality of Care and Clinical Outcomes* 2020; 6: 210-6. <https://doi.org/10.1093/EHJQCCO/QCAA046>.
 35. OPS. El 70% de las personas con Chagas no saben que están infectadas - OPS/OMS | Organización Panamericana de la Salud 2021. <https://www.paho.org/es/noticias/13-4-2021-70-personas-con-chagas-no-saben-que-están-infectadas> (accessed January 28, 2022).
 36. Villamil-Gómez WE, Rodríguez-Morales AJ. Cocirculación y coinfección de COVID-19 y Patógenos Tropicales Endémicos de América Latina: Enfermedad de Chagas. *Revista Peruana de Investigación En Salud* 2021; 5: 57-8. <https://doi.org/10.35839/REPIS.5.2.1033>.
 37. Hasslocher-Moreno AM, Saraiva RM, Silva GMSD, Xavier SS, Sousa AS, Costa ARD, Mendes FSNS, Mediano MFF. Chagas disease mortality during the coronavirus disease 2019 pandemic: A Brazilian referral center experience. *Rev Soc Bras Med Trop.* 2022 Feb 25;55:e0562. doi: 10.1590/0037-8682-0562-2021. PMID: 35239914; PMCID: PMC8909444.
 38. Fernandez ML, Benchetrit A, Astudillo OG, Garay AM, De Vedia L, Garcia Bournissen F, Lloveras SC, Orduna TA and Gonzalez GD (2022) COVID-19 and Chagas Disease in Buenos Aires, Argentina. *Front. Trop. Dis* 2:779428. doi: 10.3389/ftd.2021.779428
 39. Alarcón de Noya B, Díaz-Bello Z, Ruiz-Guevara R and Noya O (2022) Chagas Disease Expands Its Epidemiological Frontiers From Rural to Urban Areas. *Front. Trop. Dis* 3:799009. doi: 10.3389/ftd.2022.799009
 40. Chadalawada S, Sillau S, Archuleta S, Mundo W, Bandali M, Parra-Henao G, Rodriguez-Morales AJ, Villamil-Gomez WE, Suárez JA, Shapiro L, Hotez PJ, Woc-Colburn L, DeSanto K, Rassi A Jr, Franco-Paredes C, Henao-Martínez AF. Risk of Chronic Cardiomyopathy Among Patients With the Acute Phase or Indeterminate Form of Chagas Disease: A Systematic Review and Meta-analysis. *JAMA Network Open.* 2020 Aug 3; 3(8): e2015072. doi: 10.1001/jamanetworkopen.2020.15072. PMID: 32865573; PMCID: PMC7489816.