Pulmonology 29 (2023) 184—187

PULMONOLOGY

www.journalpulmonology.org

COMMENT

Learning with the COVID-19 pandemic mistakes: Facing the progression of the first cases of Monkeypox in Brazil

M.N. Boschiero[a,1], C.V.C. Palamim[a,b,1], F.A.L. Marson[a,b,1,*]

[a] Laboratory of Cell and Molecular Tumor Biology and Bioactive Compounds, São Francisco University, Bragança Paulista, SP, Brazil
[b] Laboratory of Human and Medical Genetics, São Francisco University, Bragança Paulista, SP, Brazil

Received 18 August 2022; accepted 29 August 2022
Available online 9 September 2022

An ongoing outbreak of Monkeypox, a viral disease, was confirmed in May 2022, during the occurrence of the most important pandemic of the 21st century, namely, Coronavirus Disease (COVID)-19. According to the literature, Monkeypox does not have the potential to cause the same impact as COVID-19 in terms of the number of people infected and deaths.[1] However, the increase in the number of Monkeypox cases is a wakeup call to Health Authorities, and it is essential to take measures to control viral dissemination. Although Monkeypox is endemic and was first reported in Central and West Africa,[2] there was a deport of a previous outbreak outside Africa in 2003.[3] The United Kingdom, Singapore, and Israel also reported cases of Monkeypox among individuals returning from Nigeria.[4] This novel outbreak was also first described in the United Kingdom by a patient who came from Nigeria on May 07, 2022.[5,6]

In Brazil, the first case of Monkeypox was diagnosed on June 08, 2022. According to the last Pan American Health Organization, on August 17, 2022, the American continent accounted for nearly 48% of the total Monkeypox cases, the most affected countries being the United States of America (12,743 cases), Brazil (3,184 cases), Canada (1,091 cases), and Peru (867 cases), with nearly 96% of the total American confirmed cases.[7] Up to now, Brazil has accounted for approximately four thousand cases and only one death.

In this context, we performed the first Brazilian data collection of Monkeypox[8] and COVID-19[9] cases in Brazil from the Our World in Data Website. In our data search, we collected information on the number of Monkeypox and COVID-19 cases. We also summarized the number of deaths due to COVID-19. The Monkeypox cases were registered from June 08, 2022, to August 25, 2022; and the COVID-19 were registered from the same period (simultaneous disease progression) and from February 26, 2020, to May 14, 2020 (progression of both diseases after the first diagnostic case) (Fig. 1a to d; and Supplementary Fig. 1a to d). We also calculated the proportion of COVID-19 cases and deaths per Monkeypox cases (Fig. 1e and f).

In our data, we observed that the COVID-19 pandemic in Brazil presented a higher transmission rate (~50x after 79 days of the first case of both diseases, Fig. 1e) than the Monkeypox viral infection, indicating that the new emergent infection has a lower potential for dissemination compared to the COVID-19, at least in this early stage. Also, to date, the number of deaths due to COVID-19 was ~3x higher than the number of Monkeypox cases in Brazil (Fig. 1f). Although Brazil built several diverse molecular biology and sequencing laboratories that can perform real-time polymerase chain reaction (RT-PCR) to identify the Monkeypox virus, we should be careful not to make the same mistakes as in the COVID-19 pandemic where we observe intensive cross-infection, mainly associated with a high COVID-19 underdiagnosis in Brazil, thus harming public health measures.[10—12] Also, the

* Corresponding author at: São Francisco University; Post graduate Program in Health Science; Laboratory of Cell and Molecular Tumor Biology and Bioactive Compounds and Laboratory of Human and Medical Genetics. Avenida São Francisco de Assis, 218. Jardim São José, Bragança Paulista, São Paulo, 12916-900, Brazil.
E-mail addresses: fernando.marson@usf.edu.br, fernandolimamarson@hotmail.com (F.A. Marson).
[1] These authors contributed equally to this study.

https://doi.org/10.1016/j.pulmoe.2022.08.007

onset of COVID-19 in Brazil was associated with a collapse in the Health System, causing high case fatality rates, as can be observed in the present study (Fig. 1d).

Although Monkeypox appears not to have the same pandemic potential as the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, it already comprises more than 46,000 total cases on August 25, 2022, in several places where Monkeypox is not common, such as the United States of America, the United Kingdom, and several other European countries.[13] Curiously, on August 25, 2022, the United States of America accounted for more than 35% of the total cases worldwide (46,679 cases with 49.96 cases per million inhabitants). In contrast, Brazil accounts for nearly 8.5% (16,837 cases with 19.67 cases per million inhabitants) of total cases.[13] In addition, there have been 13 deaths due to Monkeypox in the world, one in Brazil as described above. The increase in Monkeypox cases might be explained by decreased population immunity against smallpox since that was eradicated and vaccinations stopped nearly 30 years ago; and due to new transmission patterns, which might increase the Monkeypox spread in the world.[5]

Although Monkeypox has been reported in several countries, its clinical presentation might differ. Perhaps one of the most significant differences may be related to skin lesions. The African skin lesions are more predictable than the American ones since the lesions have macule-papule-pustule evolution, which desquamates in 14 to 21 days, leaving a varioliform scarring;[14,15] in contrast, the American skin lesions vary their morphology from person to person, even among infected people from the same family,[15,16] in that the lesions have a papule-vesicle-pustule evolution, with erythematous flares, which are not reported in African cases.[15]

Even though the COVID-19 pandemic and the Monkeypox outbreak present some similar challenges, such as preconceptions against those who are most affected, the need for an efficient testing public policy, and the difficulty of clinical

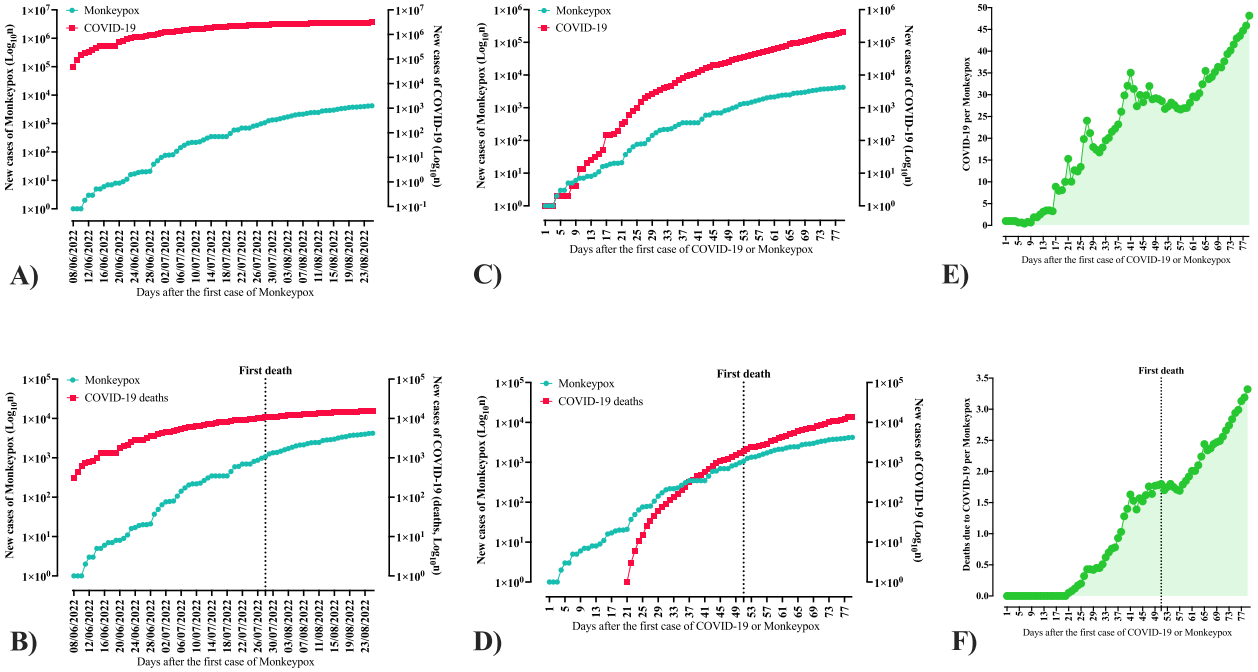

Fig. 1 Monkeypox and Coronavirus Disease (COVID)-19 disease progression in Brazil. We presented the cumulative number of new cases for both diseases (Monkeypox and COVID-19) per day and the cumulative number of new deaths due to COVID-19 per day. **A)** The cumulative number of new Monkeypox cases vs. the cumulative number of new cases of COVID-19 considering the period after the diagnosis of the first case of Monkeypox in Brazil. **B)** The cumulative number of new Monkeypox cases vs. the cumulative number of new deaths due to COVID-19 considering the period after the diagnosis of the first case of Monkeypox in Brazil. **C)** The cumulative number of new Monkeypox cases considering the period after the diagnosis of the first case of Monkeypox in Brazil vs. the cumulative number of new cases of COVID-19 considering the period after the diagnosis of the first case of COVID-19 in Brazil. **D)** The cumulative number of new Monkeypox cases considering the period after the diagnosis of the first case of Monkeypox in Brazil vs. the cumulative number of new deaths due to COVID-19 considering the period after the diagnosis of the first case of COVID-19 in Brazil. **E)** Proportion of new COVID-19 cases per new Monkeypox cases for the progression of both diseases after the diagnosis of the first case for both diseases – we calculated the proportion using the cumulative number of cases. **F)** Proportion of new deaths due to COVID-19 per new Monkeypox cases for the progression of both diseases after the diagnosis of the first case for both diseases – we calculated the proportion using the cumulative number of cases. We adjusted the y-axis (left – Monkeypox and right – COVID-19) using the Log_{10} scale to present our data in Fig. 1A to D with the units. We presented the x-axis as data for Fig. 1A and B, and as days after the first case for Fig. 1C to F. In Fig. 1C, D, and F, we marked the day where the first death due to Monkeypox in Brazil occurred. We retrieved the data from Our World in Data.[8,9] The Monkeypox cases were registered from June 08, 2022, to August 25, 2022; and the COVID-19 were registered from the same period (simultaneous disease progression) and from February 26, 2020, to May 14, 2020 (progression of both diseases after the first diagnostic case).

management of a little-known disease,[17] there might be some room for optimism, since there are treatments and vaccinations available, even though not fully available for countries in Latin America. In addition, the Smallpox vaccine appears to confer nearly 85% protection against Monkeypox.[18–20]

However, one fact needs to be called to attention; we observed a constant increase in the number of cases of Monkeypox while the number of new cases of COVID-19 is stagnating in Brazil. Furthermore, it is difficult to discuss the impact of the new Monkeypox in Brazil, even in more susceptible individuals, such as Indigenous peoples, Black/*Pardos* (multiracial background), and older individuals, when compared with COVID-19, which caused a significant impact in our country, since the disease onset was reported two years later.[21] Also, in a recent report, nearly 41% of the individuals with Monkeypox had Human Immunodeficiency Virus (HIV) infection, which could be a problem for Latin America, especially Brazil, since we have a high prevalence of people living with HIV.[22]

Curiously, after the COVID-19 pandemic, the Latin-American countries are better prepared to confront a new possible pandemic, such as the Monkeypox disease outbreak as described by Rodriguez-Morales and collaborators, as well as Cimerman and collaborators. They discussed the importance of optimizing genetic testing to identify the viral agent, which was improved during COVID-19, and also strengthening surveillance systems.[10,23] For example, the first case of the Monkeypox virus in Brazil was sequenced and published using shotgun metagenomic sequencing days after the clinical suspicion.[24] However, we should approach the Monkeypox threat carefully in developing countries, such as those in Latin America, since although experimental drugs, such as Cidofovir and Tecovirimat, have proven efficacy, and vaccines for contacts of positive cases have been implemented,[23] not only might the high prices of these inputs not be affordable for Latin America countries, but also they may not be available, which could enhance the Monkeypox threat.

Brazil is, fortunately, better prepared at least to diagnose Monkeypox compared to the COVID-19 diagnosis at the onset of the pandemic, mainly in the first wave, and it also has a strengthened surveillance system. Monkeypox does not have the same capacity to be a new pandemic compared with COVID-19, with low chances of infecting new individuals and causing deaths, as we present in our data (Fig. 1e and f).

However, we are in the early stages of this outbreak and have limited information about the Monkeypox disease progression in Brazil and the world. In addition, there is no evidence about the impact of the new viral infection among those with COVID-19 and susceptible individuals, which is alarming in Brazil, where several groups deserve special attention, such as the Indigenous peoples and those living with HIV. Countries around the world should learn from the Brazilian mistakes in the management of a pandemic, such as the COVID-19 ones.[25] Although Monkeypox appears not to have the same dissemination potential, public health policies should be adopted, such as a proper testing policy, implementation of vaccination, proper clinical management, self-isolation, when necessary, using only scientific data to guide public health policies, and even the investment in new antivirals to treat Monkeypox, in order to decrease the spread and lethality of Monkeypox, avoiding a new "COVID-19 crisis".

Funding

[MNB] Fundação de Amparo à Pesquisa do Estado de São Paulo (Foundation for Research Support of the State of São Paulo, Brazil; #2022/05810-7).

Ethics approval

The data used in our study were made publicly available, not containing consent-free personal data since it does not present risks to the research participants.

Consent to participate

Not required.

Consent for publication

The authors have approved the manuscript and agreed with the submission.

Data and material availability

We accessed the complete data in Our World in Data (https://ourworldindata.org/).

Code availability

Not required.

Authors' contributions

(FALM) made substantial contributions to the study conception and design; and performed the acquisition, analysis, and interpretation of data for the work. (MNB, CVCP, and FALM) drafted the work and revised it critically for important intellectual content. (MNB, CVCP, and FALM) gave the final approval for the version to be published.

Conflicts of interest

Not required.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.pulmoe.2022.08.007.

References

1. Taseen S, Nasir F, Abbas M, Altaf M, Asghar MS, Tahir MJ Post-pandemic world at the mercy of Monkeypox virus outbreak: time to worry or not?*J Med Viro*l**n.d.;n/a**(n/a). https://doi.org/10.1002/jmv.27948.
2. McCollum AM, Damon IK. Human Monkeypox. Clin Infect Dis. 2014;58(2):260—7. https://doi.org/10.1093/cid/cit703.
3. Reed KD, Melski JW, Graham MB, Regnery RL, Sotir MJ, Wegner MV, et al. The detection of Monkeypox in humans in the Western Hemisphere. N Engl J Med. 2004;350(4):342—50. https://doi.org/10.1056/NEJMoa032299.
4. Sklenovská N, Van Ranst M. Emergence of Monkeypox as the Most Important Orthopoxvirus Infection in Humans. Front Public Health. 2018;6:241. https://doi.org/10.3389/fpubh.2018.00241.
5. Zhang Y, Zhang J-Y, Wang F-S. Monkeypox outbreak: a novel threat after COVID-19? Mil Med Res. 2022;9(1):29. https://doi.org/10.1186/s40779-022-00395-y.
6. Monkeypox Cases Confirmed in England — Latest Updates. GOV.UK. Available from: https://www.gov.uk/government/news/monkeypox-cases-confirmed-in-england-latest-updates [accessed August 25, 2022].
7. Weekly Situation Report on Monkeypox Multi-Country Outbreak Response - Region of the Americas. PAHO/WHO | Pan American Health Organization; 2022. 19 August. Available from: https://www.paho.org/en/documents/weekly-situation-report-monkeypox-multi-country-outbreak-response-region-americas-19 [accessed August 25, 2022].
8. Mathieu E, Spooner F, Dattani S, Ritchie H, Roser M. Monkeypox. Our World in Data; 2022.
9. Ritchie H, Mathieu E, Rodés-Guirao L, Appel C, Giattino C, Ortiz-Ospina E, et al. Coronavirus Pandemic (COVID-19). Our World in Data; 2020.
10. Cimerman S, Chebabo A, da Cunha CA, Barbosa AN, Rodríguez-Morales AJ. Human monkeypox preparedness in Latin America - are we ready for the next viral zoonotic disease outbreak after COVID-19? Braz J Infect Dis. 2022;26(3):102372. https://doi.org/10.1016/j.bjid.2022.102372.
11. Bastos SB, Cajueiro DO. Modeling and forecasting the early evolution of the Covid-19 pandemic in Brazil. Sci Rep. 2020;10(1):19457. https://doi.org/10.1038/s41598-020-76257-1.
12. Carvalho TA, Boschiero MN, Marson FAL. COVID-19 in Brazil: 150,000 deaths and the Brazilian underreporting. Diagn Microbiol Infect Dis. 2021;99(3):115258. https://doi.org/10.1016/j.diagmicrobio.2020.115258.
13. CDC. Monkeypox in the U.S. Centers for Disease Control and Prevention. Available from: https://www.cdc.gov/poxvirus/monkeypox/response/2022/world-map.html [accessed August 25, 2022].
14. Breman JG. Monkeypox: an Emerging Infection for Humans? *Emerging Infections*, 4. John Wiley & Sons, Ltd; 2000. p. 45—67.
15. Sale TA, Melski JW, Stratman EJ. Monkeypox: an epidemiologic and clinical comparison of African and US disease. J Am Acad Dermatol. 2006;55(3):478—81. https://doi.org/10.1016/j.jaad.2006.05.061.
16. Sejvar JJ, Chowdary Y, Schomogyi M, Stevens J, Patel J, Karem K, et al. Human monkeypox infection: a family cluster in the midwestern United States. J Infect Dis. 2004;190(10):1833—40. https://doi.org/10.1086/425039.
17. Bosworth A, Wakerley D, Houlihan CF, Atabani SF. Monkeypox: an old foe, with new challenges. Infect Prev Pract. 2022;4(3):100229. https://doi.org/10.1016/j.infpip.2022.100229.
18. Berhanu A, Prigge JT, Silvera PM, Honeychurch KM, Hruby DE, Grosenbach DW. Treatment with the smallpox antiviral tecovirimat (ST-246) alone or in combination with ACAM2000 vaccination is effective as a postsymptomatic therapy for monkeypox virus infection. Antimicrob Agents Chemother. 2015;59(7):4296—300. https://doi.org/10.1128/AAC.00208-15.
19. Monkeypox Vaccination Recommendations. GOV.UK. Available from: https://www.gov.uk/government/publications/monkeypox-vaccination [accessed August 25, 2022].
20. Petersen BW, Kabamba J, McCollum AM, Lushima RS, Wemakoy EO, Muyembe Tamfum J-J, et al. Vaccinating against Monkeypox in the Democratic Republic of the Congo. Antiviral Res. 2019;162:171—7. https://doi.org/10.1016/j.antiviral.2018.11.004.
21. Marson FAL, Ortega MM. COVID-19 in Brazil. Pulmonol. 2020;26(4):241—4. https://doi.org/10.1016/j.pulmoe.2020.04.008.
22. Thornhill JP, Barkati S, Walmsley S, Rockstroh J, Antinori A, Harrison LB, et al. Monkeypox virus infection in humans across 16 countries — April—June 2022. N Engl J Med. 2022;387(8):679—91. https://doi.org/10.1056/NEJMoa2207323.
23. Rodriguez-Morales AJ, Lopardo G, Verbanaz S, Orduna T, Lloveras S, Azeñas-Burgoa JM, et al. Latin America: situation and preparedness facing the multi-country human Monkeypox outbreak. Lancet Reg Health Am. 2022;13:100318. https://doi.org/10.1016/j.lana.2022.100318.
24. Claro IM, Romano CM, da Candido DS, de Lima EL, Lindoso JAL, Ramundo MS, et al. Shotgun metagenomic sequencing of the first case of Monkeypox virus in Brazil, 2022. Rev Inst Med Trop Sao Paulo. 2022;64:e48. https://doi.org/10.1590/S1678-9946202264048.
25. Boschiero MN, Palamim CVC, Ortega MM, Mauch RM, Marson FAL. One year of coronavirus disease 2019 (COVID-19) in Brazil: a political and social overview. Ann Glob Health. 2021;87(1):44. https://doi.org/10.5334/aogh.3182.