JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Coronavirus Pandemic

COVID-19 in people living with HIV: a single-center descriptive study

Edgar Pérez-Barragán[1], José Humberto Castillo-Flores[2], José Antonio Mata-Marín[1], Sara Gabriela Franco López[1], Brian Alexis Morales Martínez[1], Samantha Pérez Cavazos[2]

[1] Infectious Diseases Department, Hospital de Infectología, Centro Médico Nacional La Raza, Mexico City, Mexico
[2] Department of Hospital Epidemiology and Infection Prevention, Hospital Christus-Muguerza Betania, Puebla, Puebla, Mexico

Abstract

Introduction: People living with human immunodeficiency virus (PLHIV) may suffer more severe symptoms of coronavirus disease 2019 (COVID-19) due to their immunocompromised status, even if they are undetectable. Human immunodeficiency virus (HIV) infection has been reported as an independent factor associated with higher mortality in patients with COVID-19. The present study aims to describe the clinical characteristics of PLHIV and COVID-19 in one center in Mexico.

Methodology: We conducted an observational retrospective monocentric cohort study of PLHIV diagnosed with COVID-19 between 1 March 2020 and 30 April 2021. SARS-CoV-2 was detected by polymerase chain reaction (PCR) of a nasopharyngeal swab sample, clinical features, and epidemiological characteristics.

Results: We identified 55 PLHIV with COVID-19. The median age was 36 years (IQR 25–41.5 years), and 54 patients were men. The median duration of HIV-1 infection was 4.3 years (Interquartile range, IQR 2.6–7.2 years), and 100% were on antiretroviral therapy (ART). The last HIV-1 RNA viral load analysis of the patients was 52/55 (94.5%) indicating that they were in virological suppression. The median CD4+ T-cell count was 734/mm^3 (IQR 541.5-921/mm^3). The most frequent pre-existing comorbidities found were obesity (21.8%), hypertension (7.2%), and diabetes (5.4%). Only one death was reported (1.8%).

Conclusions: It has been reported that COVID-19/HIV/AIDS co-infection has a higher risk of mortality, admission to intensive care, and complications. However, our study found that people living with HIV-1 with adequate virological control did not present a severe course of COVID -19.

Key words: Coronavirus; SARS-CoV-2; virus; infection.

J Infect Dev Ctries 2022; 16(12):1796-1799. doi:10.3855/jidc.16990

(Received 18 June 2022 – Accepted 05 September 2022)

Introduction

SARS-CoV-2 has spread rapidly around the world and by June 2022, 537,736,109 cases of coronavirus disease 2019 (COVID-19) and 6.3 million deaths have been reported worldwide, of whom 6.3 million have died. Over 5.8 million cases and more than 325,000 deaths have been reported in Mexico [1]. The main risk factors associated with severe COVID-19 are obesity, diabetes, hypertension, cardiovascular disease, chronic kidney disease, and chronic lung disease [2,3]. It is still unclear whether people living with human immunodeficiency virus (PLHIV) are at an increased risk of developing severe SARS-CoV-2-related illnesses.

Literature published since the beginning of the pandemic have documented higher COVID-19 related mortality in PLHIV; however, these reports did not provide conclusive evidence [4,5]. Recently, a meta-analysis published by Dzinamarira and colleagues which included 16 studies of PLHIV with concomitant SARS-CoV-2 infection concluded that there is no significant higher risk of mortality in PLHIV (RR 1.07, 95% CI 0.86-1.32) which leads to more questions due to the lack of concrete evidence [6].

Given this uncertain scenario and the continuous circulation of SARS-CoV-2 variants, we describe the clinical and demographic characteristics of a Mexican cohort of PLHIV in order to enrich the current Latin-American epidemiology data.

Methodology

We conducted a retrospective study at a second-level hospital of the Instituto Mexicano del Seguro Social in Mexico City which has a clinic specializing in care for PLHIV. Adult patients in this area who receive periodic follow-up at the hospital and who were diagnosed with COVID-19 through the detection of SARS-CoV-2 by nasopharyngeal swab reverse transcription polymerase chain reaction (RT-PCR) between 1 March 2020 to 30 April 2021, with clinical

compatible data were included. The following patient information was collected: demographic data, comorbidities, last CD4+ cell count (cells/mm^3) and Human Immunodeficiency Virus-1 RNA viral load (VL, copies/mL), Antiretroviral therapy (ART), clinical presentation of COVID-19, and clinical outcome. Descriptive statistics are presented as mean and standard deviation or median and interquartile range (IQR) for continuous variables and frequencies for categorical variables. The local research committee approved the study and patient privacy was guaranteed.

Results

Among the 890 HIV-1 positive people receiving care at the HIV clinic in our center, we identified 55 PLHIV with PCR-confirmed diagnosis of COVID-19, resulting in a rate of infection of 6.1%. The median age was 36 years (IQR 25–41.5 years), 54 were men and 1 was a woman. The median duration of HIV-1 infection was 4.3 years (IQR 2.6–7.2 years), and 100% of the patients were on antiretroviral therapy. A total of 52 (94.5%) patients received integrase strand transfer inhibitor (INSTI)-based therapy, 2 (3.6%) were treated with protease inhibitors (PI) and 1 (1.8%) with non-nucleoside reverse transcriptase inhibitors (NNRTI). Out of the 55 patients studied, 52 were in virological suppression (HIV-1 RNA viral load < 50 copies/mL), one patient was considered as a viral blip (65 copies/mL and previously with undetectable HIV-1 RNA viral load), one with low-level viremia (115 copies/mL) and one patient-reported an HIV-1 RNA viral load of 32,213 copies/mL prior to starting antiretroviral therapy less than a month earlier. The last median CD4+ T-cell count before SARS-CoV-2 infection was 734/mm^3 (IQR 541.5-921/mm^3). No patients had a CD4 count of fewer than 200 cells/mm^3. The most frequent pre-existing comorbidities were obesity (21.8 %), hypertension (7.2 %), and diabetes mellitus (5.4 %).

The most common symptoms were arthralgia/myalgia (61.8%), fever (56.3%), cough 54.5%), anosmia (52.7%) and ageusia/dysgeusia (50.9%). According to the National Institutes of Health severity of illness categories, 58.1% had mild disease and 14.5% had severe disease; 5 patients were admitted to the hospital needing supplemental oxygen, and another patient was at home receiving supplemental oxygen. One patient died (1.8%). She was the only woman in the study; she required mechanical ventilation, had grade III obesity, and had an undetectable HIV-1 RNA viral load. Hospitalized patients received supplemental oxygen, steroids, and antibiotics, according to the criteria of the attending physicians. There is no data on treatments received by the outpatients. The main clinical characteristics of PLHIV and COVID-19 are shown in Table 1.

Table 1. Characteristics of PLHIV and COVID-19 in a-single Mexican center.

Characteristics	PLHIV and COVID-19 (n = 55)
Age (years), median (IQR)	36 (25-41.5)
Gender	
Women, n	1 (1.8%)
Men, n	54 (98.1%)
HIV infection time (years)/median (IQR)	4.3 (2.6-7.2)
Antiretroviral therapy	
Any	100%
INSTI	94.5%
NNTR	3.6%
PI	1.8%
CD4+ (cells/mm^3)/median (IQR)	734 (541.5–921)
> 500 cells/mm^3	83.6%
200-499 cells/mm^3	16.3%
< 200 cells/mm^3	0%
HIV status	
Undetectable, n	51 (92.7%)
Non undetectable, n	4 (7.2%)
Comorbidities	
Diabetes	5.4%
Hypertension	7.2%
Obesity	21.8%
CKD	1.8%
Asthma	1.8%
COPD	1.8%
Smoker	49%
HCV infection	3.6%
HBV infection	3.6%
Symptoms	
Fever	56.3%
Cough	54.5%
Artharlgia/dysgeusia	61.8%
Anosmia	52.7%
Ageusia/dysgeusia	50.9%
Headache	14.5%
Dyspnea	14.5%
Diarrhea	18.1%
Rhinorrhea	10.9%
Sore throat	10.9%
Severity COVID-19*	
Mild	58.1%
Moderate	25.4%
Several	14.5%
Critical	1.8%
Support Oxygen	
No oxygen support requirements	89.1%
Oxygen support requirements	10.9%
Hospital	9%
Domiciliary	1.8%
Invasive mechanical ventilation	1.8%
Mortality	
Survivors	98.2%
Death	1.8%

IQR: interquartile range; INSTI: integrase strand transfer inhibitor; NNRTI: non-nucleoside reverse transcriptase inhibitor; PI: protease inhibitors; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; HIV: Human immunodeficiency virus; HCV: Hepatitis C virus; HBV: Hepatitis B virus, PLHIV: people living with human immunodeficiency virus; COVID-19: coronavirus disease 2019. * According to the National Institutes of Health.

Discussion

In this single-center study, we report the clinical course and outcomes for 55 PLHIV with confirmed SARS-CoV-2 infection. Our population was young, predominantly male, and were all on antiretroviral therapy mostly based on INSTI and most reported mild COVID-19 disease.

The observed rate of infection among the HIV-1 infected individuals was 6.1%, with a cumulative incidence rate of 6,179 cases per 100,000 inhabitants. This was higher than that reported by the Secretary of Health of Mexico for the general population on similar dates (4,497.9 cases per 100,000 inhabitants) [7]. Currently, there is no data indicating that PLHIV are at higher risk of acquiring SARS-CoV-2 infection; so, these differences could be explained by underreporting in the Mexican health system. The population we studied was young, with a median age of 36 years. Other studies found that patients living with HIV aged 45-75 years, compared to individuals without HIV, had a 15% increased probability of a severe presentation with COVID-19 and a 38% increased risk of mortality [4]. It is important to note that in Mexico about 66% of PLHIV are between 20-44 years old; that is, a predominantly young population [8]. Most patients received INSTI, similar to the majority of PLHIV in Mexico, and only a small group received other antiretrovirals. It is not possible to make any association of protective effect or outcome according to the antiretroviral therapy received. The most frequent symptoms did not differ from other reports of COVID-19 in PLHIV or the general population [9–11].

The most frequent pre-existing comorbidities reported in our study were obesity, hypertension, and diabetes. We did not find differences with other reports of COVID-19 in PLHIV on comorbidities, except obesity [9,10]. Ortiz-Brizuela *et al.* reported similar results from Mexico and the major risk factor observed in their sample was obesity [11]. Other authors have reported obesity as a risk factor for death and adverse outcomes in Mexican patients with COVID-19 [12,13]. The only woman in our cohort died. She had adequate control of HIV infection, but she was obese. This is lower than that reported by Härter *et al.* in their study [10]. Mexico has a high prevalence of obesity and according to the Encuesta Nacional de Salud y Nutrición (ENSANUT 2020), the prevalence of overweight and obesity (Body Mass Index (BMI) ≥ 25 kg/m^2) in people ≥ 20 years was 76% in women and 72.1% in men [14]. This could explain the fact that our findings are similar to other Mexican authors, regardless of the COVID-19/HIV association. Some meta-analyses stratified the existence of comorbidities and found that the association between HIV and COVID-19 mortality was significantly higher in those with comorbidities, however, when the risk factors were adjusted, it was concluded that HIV infection was independently associated with an increased risk of mortality in patients with COVID-19 [4,5].

Some authors consider that PLHIV with CD4 counts below 200 cells/mm^3, unsuppressed HIV-1 RNA viral load, or opportunistic illnesses could be a population at risk of severe COVID-19 disease [15]. The patients in the current report were generally controlled, with > 90% with undetectable HIV-1 RNA viral load, and the median CD4+ cell count > 500; they were detected at an early stage of the COVID-19 infection and there was a timely initiation of treatment. This could explain the majority of cases being mild. In other cohorts, a significant percentage of mortality in PLHIV with COVID-19 has been associated with the lack of early medical care due to hospital saturation experienced in Mexico [16]. Some authors recognize a crisis and inequity for care in people with COVID-19 and HIV that could also contribute to the higher mortality [17].

Bertagnolio *et al.* analyzed the data collection of the World Health Organization (WHO) Clinical Platform that included 16955 PLHIV with SARS-CoV-2 infection in 38 countries and they found that compared with people who were HIV-negative, the PLHIV had a 15% increased odds of severe course due to COVID-19 (aOR 1.15, 95% CI 1.10-1.20) and 38% increased risk of in-hospital death (aHR 1.38, 95% CI 1.34-1.41), regardless of antiretroviral therapy (ART) and HIV-1 RNA viral load suppression status [4]. Another meta-analysis concluded that HIV coinfection with COVID-19 increased the risk of mortality and intensive care unit admission [18]. The population of our cohort was young and with few comorbidities, which could contribute to the low presentation of severe COVID-19 and lower mortality.

Our study has important limitations. This is an observational uncontrolled study with a low number of participants; information on the onset and duration of symptoms, COVID-19 risk behaviors, social determinants of health, treatment, laboratory findings, and radiology is lacking. Despite these limitations, we believe that we provide important information on the behavior of the COVID-19 disease in PLHIV.

Conclusions

It has been reported that COVID-19/HIV/AIDS co-infection has a higher risk of mortality, admission to

intensive care unit, and complications. However, despite the limitations and a low number of participants, our study found that people living with HIV with adequate virological control did not present a severe course of COVID-19.

Authors' Contributions

EPB and SPC: coordination; JHCF, SGFL, BAMM: analysis and writing; JAMM: conception and coordination.

References

1. Johns Hopkins University (2021) COVID-19 Dashboard. Available: https://coronavirus.jhu.edu/map.html. Accessed: 7 March 2021.
2. Rosenthal N, Cao Z, Gundrum J, Sianis J, Safo S (2020) Risk factors associated with in-hospital mortality in a US national sample of patients with COVID-19. JAMA Netw Open 3: e2029058.
3. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, Xiang J, Wang Y, Song B, Gu X, Guan L, Wei Y, Li H, Wu X, Xu J, Tu S, Zhang Y, Chen H, Cao B (2020) Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet 395: 1054-1062.
4. Bertagnolio S, Thwin SS, Silva R, Nagarajan S, Jassat W, Fowler R, Haniffa R, Reveiz L, Ford N, Doherty M, Diaz J (2022) Clinical features of, and risk factors for, severe or fatal COVID-19 among people living with HIV admitted to hospital: analysis of data from the WHO Global Clinical Platform of COVID-19. Lancet HIV 9: e486–e495.
5. Han X, Hou H, Xu J, Ren J, Li S, Wang Y, (2022) Significant association between HIV infection and increased risk of COVID-19 mortality: a meta-analysis based on adjusted effect estimates. Clin Exp Med Jun 13: 1-12.
6. Dzinamarira T, Murewanhema G, Chitungo I, Ngara B, Nkambule SJ, Madziva R, Herrera H, Mukwenha S, Cuadros DF, Iradukunda PG, Mashora M, Tungwarara N, Rwibasira GN, Musuka G (2022) Risk of mortality in HIV-infected COVID-19 patients: a systematic review and meta-analysis. J Infect Public Health 15: 654–661.
7. Government of Mexico (2022) Daily technical report and weekly report COVID19. Available from: http://www.gob.mx/salud/documentos/informe-tecnico-diario-covid19-2022. Accessed: 4 December 22. [Article in Spanish].
8. Government of Mexico (2022) Epidemiology National Registry of HIV and AIDS cases. Available from: http://www.gob.mx/censida/documentos/epidemiologia-registro-nacional-de-casos-de-sida Accessed: 4 December 2022. [Article in Spanish].
9. Vizcarra P, Pérez-Elías MJ, Quereda C, Moreno A, Vivancos MJ, Dronda F, Casado JL, COVID-19 ID Team (2020) Description of COVID-19 in HIV-infected individuals: a single-centre, prospective cohort. Lancet HIV 7: e554–564.
10. Härter G, Spinner CD, Roider J, Bickel M, Krznaric I, Grunwald S, Schabaz F, Gillor D, Postel N, Mueller MC, Müller M, Römer K, Schewe K, Hoffmann C. COVID-19 in people living with human immunodeficiency virus: a case series of 33 patients. Infection 48: 681–686.
11. Ortiz-Brizuela E, Villanueva-Reza M, González-Lara MF, Tamez-Torres KM, Román-Montes CM, Díaz-Mejía BA, Pérez-García E, Olivas-Martínez A, Rajme-López S, Martinez-Guerra BA, de-León-Cividanes NA, Fernández-García OA, Guerrero-Torres L, Torres-González L, Carrera-Patiño FA, Corral-Herrera EA, Hernández-Alemón AN, Tovar-Vargas MLÁ, Serrano-Pinto YG, Espejo-Ortiz CE, Morales-Ortega ML, Lozano-Cruz ÓA, Cárdenas JL, Vidal-Mayo JJ, Hernández-Gilsoul T, Rivero-Sigarroa E, Domínguez-Cherit G, Cervantes-Villar LE, Ramos-Cervantes MDP, Ibarra-González V, Calva-Mercado JJ, Sierra-Madero JG, López-Íñiguez Á, Ochoa-Hein E, Crabtree-Ramírez BE, Galindo-Fraga A, Guerrero-Almeida ML, Ruiz-Palacios GM, Gulías-Herrero A, Sifuentes-Osornio J, Kershenobich-Stalnikowitz D, Ponce-de-León A. (2020) Clinical and epidemiological characteristics of patients diagnosed with COVID-19 in a tertiary care center in Mexico city: a prospective cohort study. Rev Invest Clin 72: 252–258.
12. Vera-Zertuche JM, Mancilla-Galindo J, Tlalpa-Prisco M, Aguilar-Alonso P, Aguirre-García MM, Segura-Badilla O, Lazcano-Hernández M, Rocha-González HI, Navarro-Cruz AR, Kammar-García A, Vidal-Mayo JJ (2021) Obesity is a strong risk factor for short-term mortality and adverse outcomes in Mexican patients with COVID-19: a national observational study. Epidemiol Infect 149: e109.
13. Peña JE de la, Rascón-Pacheco RA, Ascencio-Montiel I de J, González-Figueroa E, Fernández-Gárate JE, Medina-Gómez OS, Borja-Bustamante P, Santillan-Oropeza JA, Borja-Aburto VH (2021) Hypertension, diabetes and obesity, major risk factors for death in patients with COVID-19 in Mexico. Arch Med Res 52: 443–449.
14. Ministry of Health Mexico (2022) National Survey of Health and Nutrition [Internet]. SURVEYS Secretaría de Salud Mexico. Available: https://ensanut.insp.mx/encuestas/ensanutcontinua2020/informes.php. Accessed: 04 December 2022. [Article in Spanish].
15. Ambrosioni J, Blanco JL, Reyes-Urueña JM, Davies MA, Sued O, Marcos MA, Martínez E, Bertagnolio S, Alcamí J, Miro JM, COVID-19 in HIV Investigators (2021) Overview of SARS-CoV-2 infection in adults living with HIV. Lancet HIV 8: e294–305.
16. Olivas-Martínez A, Cárdenas-Fragoso JL, Jiménez JV, Lozano-Cruz OA, Ortiz-Brizuela E, Tovar-Méndez VH, Medrano-Borromeo C, Martínez-Valenzuela A, Román-Montes CM, Martínez-Guerra B, González-Lara MF, Hernandez-Gilsoul T, Herrero AG, Tamez-Flores KM, Ochoa-Hein E, Ponce-de-León A, Galindo-Fraga A, Kershenobich-Stalnikowitz D, Sifuentes-Osornio J. (2021) In-hospital mortality from severe COVID-19 in a tertiary care center in Mexico City; causes of death, risk factors and the impact of hospital saturation. PLoS One 16: e0245772.
17. Waterfield KC, Shah GH, Etheredge GD, Ikhile O (2021) Consequences of COVID-19 crisis for persons with HIV: the impact of social determinants of health. BMC Public Health 21: 299.
18. Moradi Y, Soheili M, Dehghanbanadaki H, Moradi G, Moradpour F, Mahdavi Mortazavi SM, Kohan HG, Zareie M, (2022) The effect of HIV/AIDS infection on the clinical outcomes of COVID-19: a meta-analysis. J Pharm Pharm Sci 25: 183–192.

Corresponding author

Samantha Pérez Cavazos, MD
Department of Hospital Epidemiology, Christus Muguerza Betania
11 Pte 1825 Azcarate, Puebla, Mexico, ZC 7250
Tel: 222 213 8300
Email: samanthaperezc@gmail.com

Conflict of interests: No conflict of interests is declared.