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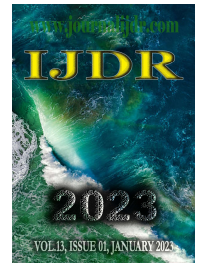
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## CLINICAL CHARACTERISTICS AND OUTCOMES AMONG BRAZILIAN PATIENTS WITH HIV/SARS-COV-2 COINFECTED: AN OBSERVATIONAL RETROSPECTIVE STUDY

Rivelino Trindade de Azevedo\*, Aluana Santana Carlos, Roberto Rangel Alves da Silva, Francisco Charles Sousa Carvalho, Sormane de Mattos Dias and Bruno César Sabino de Figueiredo

Hospital Municipal Ronaldo Gazolla-HMRG

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#### \*Corresponding author:

Rivelino Trindade de Azevedo

### ABSTRACT

**Background:** Patients with human immunodeficiency virus (HIV) infection be capable of a high risk for mortality from the coronavirus disease 2019 (COVID-19). We present the clinical outcomes of HIV patients hospitalized for COVID-19. **Methods:** We conducted a retrospective cohort study of HIV patients admitted for COVID-19 between January 2021 and August 2021 to Hospital Municipal Ronaldo Gazolla. Data on baseline clinical characteristics, computed tomography of the chest, and outcome. **Results:** During the study period, 40 HIV patients were admitted for COVID-19, and 9 were excluded for not meeting the eligibility criteria. 67.7% are male and 32.3% are female. The COVID-19 tests for RT-PCR (51.6%) and Antigen Test (29.0%). The comorbid included hypertension (17%), obesity (2.7%), or diabetes mellitus (5.7%). The O<sub>2</sub> supply was nasal O<sub>2</sub> cannula (73.3%), high flow nasal (10%), and mechanical ventilator (6.67%), and no use oxygen was 10%. A total of 32% of HIV patients were hospitalized with outcomes of death, and 25 (75.76%) was a survivor. In the findings of chest CT images, ground-glass opacity was more expressive at 29.0% have 25-50%. **Conclusion:** Data on the association of human immunodeficiency virus (HIV) infection with adverse outcomes in patients with COVID-19 are conflicting in the literature. Our findings suggest that patients with HIV have an increased risk of hospital admission for COVID-19, but especially in Hospital Ronaldo Gazolla outcome is survival for these patients.

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## INTRODUCTION

Coronavirus disease-2019 (COVID-19) is a novel respiratory infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Infection by a coronavirus (SARS CoV-2) is a contagious infectious disease that causes pneumonia that was discovered in the city of Wuhan, Hubei province, China in the second half of 2019 (Zheng, 2020). Initial data from China display several risk factors for severe COVID-19 and mortality, such as older age, immunosuppressed status, hypertension, diabetes, and chronic cardiovascular and respiratory disease (Duarte, 2021). Firstly, HIV infection would be a risk factor for severe COVID-19, but studies have had mixed conclusions (Shi, 2021 and Hu, 2021). People infected with HIV have a generally high risk of opportunistic infections. SARS-CoV-2 currently presents a major challenge to be considered (Alves, 2021). It remains unclear if differences in COVID-19 outcomes are driven by differences in HIV-specific factors, underlying health conditions, or adverse social determinants of health.

The SARS-CoV-2 in HIV-infected patients is a greater vulnerability in the immunological, in view of the greater medical vulnerability, known to be known by the viruses provided by the virus and the insufficient scientific knowledge (Werneck, 2021). Severe Acute Respiratory Syndrome (SARS) is considered the main complication caused by lung injuries caused by SARS CoV-2 and that can lead to death (UN Joint Programme on HIV/AIDS, 2021). According to the latest Pan American Health Organization regulation, approximately 14% of those infected with the new coronavirus need supplemental oxygen due to respiratory failure resulting from lung injury; And of these, 5% evolve to need assistance and surveillance in the Intensive Care Unit (ICU) with the use of invasive ventilation in a short period of hospitalization (UN Joint Programme on HIV/AIDS, 2019). However, many countries did not have sufficient quantity and speed of ICUs and/or mechanical ventilation devices at that time (OPAS, 2020). Many of these studies were from the earliest months of the pandemic and may not have reflected subsequent advances in COVID treatment and enhanced prevention. The aim of this study was to analyze clinical features and CT findings in patients with HIV diagnosed with COVID-19 in the hospital Ronaldo Gazolla.

## METHODOLOGY

**Study design:** This was a retrospective study, based on individual data from Brazilian patients that were collected from the TIMED electronic in a public reference hospital for COVID-19 in the municipality of Rio de Janeiro, Hospital Municipal Ronaldo Gazolla, between January 2021 and August 2021. Ethical approval was obtained from a local ethics committee (reference number 51408921.1.0000.5279). The study authors did not have any contact with the patients described. Data collected included (a) patient-related characteristics such as age, gender, and co-morbidities; (b) HIV treatment status; (c) Type of supplemental oxygen therapy and (d) hospitalization. The inclusion criteria were as follows: aged >18 years with confirmed HIV-1 infection, history of past, latent, or active tuberculosis; co-morbidities; type of supplemental oxygen therapy, and outcome of hospitalization. (i) laboratory-confirmed COVID-19 defined as having either a positive SARS-CoV-2 antigen (Ag) or qualitative real-time polymerase chain reaction (RT-PCR) assay; or (ii) radiologically diagnosed COVID-19 defined as findings on chest computed tomography (CT); or (iii) clinically COVID-19 defined as upper and/or lower respiratory symptoms compatible with COVID-19 in the absence of laboratory and radiological confirmation.

**Statistics:** Graphical representations were performed in Prism (v9; GraphPad Software). Statistical tests were performed in Prism. ANOVA Two-way test and Kruskal-Wallis were used for group comparisons. P values less than 0.05 were considered to indicate statistical significance.

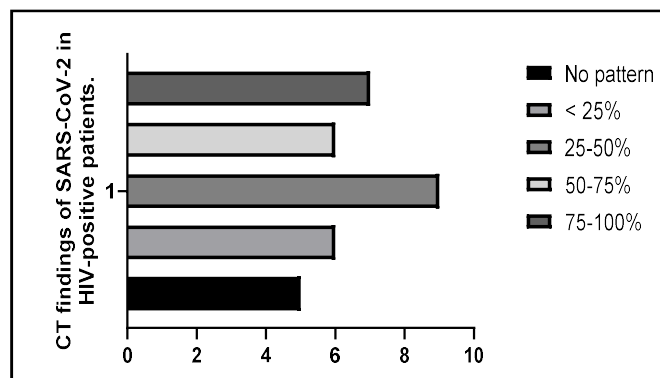
## RESULTS

During the study period, 40 HIV patients were admitted for COVID-19, and 9 were excluded for not meeting the eligibility criteria. Of the 31 cases eligible for the study, 21 (67.7%) are male and 10 (32.3%) are female. The majority, 18 (58.1%) were aged over 40 years. The RT PCR COVID was positive in 16 (51.6%) of the cases and the COVID Antigen Test in 9 (29.0%).

**Table 1. Demographic and clinical characteristics of 35 patients with SARS-CoV-19 HIV. Values are expressed as the n (%)**

Characteristics	Number (%)
<i>Gender</i>	
<i>Men</i>	21 (67.7)
<i>Womans</i>	14 (32.3)
<i>Comorbidities</i>	
<i>Hypertension</i>	6 (17)
<i>Diabetes Mellitus</i>	2 (5.7)
<i>Obesity</i>	1 (2,7)
<i>Antiretroviraltherapy (ART)</i>	22 (87.1)
<i>COVIDtest</i>	
<i>PCR COVID-19</i>	16 (51.6)
<i>COVID-19Antigen</i>	9 (29)
<i>O2 supply</i>	
<i>No oxygen</i>	3 (10)
<i>Nasal O2 cannula</i>	22 (73,33)
<i>High flow nasal</i>	3 (10)
<i>Mechanicalventilator</i>	2 (6,67)
<i>Outcome</i>	
<i>Deaths</i>	8 (32)
<i>survivors</i>	25 (75,76)

Patients who required hospitalization for COVID-19 had high rates of co-existing medical conditions, which included hypertension (17%), obesity (2,7%), or diabetes mellitus (5,7%). A total of 28 (90.3%) HIV patients were admitted using an oxygen supply due to acute respiratory inspiration such as COVID-19.



**Figure 1. CT findings of SARS-CoV-2 in HIV-positive patients. The number of patients at each sampling point was listed at the top. Two-way Anova**

The use of no oxygen (10%), nasal O2 cannula (73,3%), high flow nasal (10%), and mechanical ventilator (6,67%). A total of 8 (32%) HIV patients hospitalized for COVID-19 were middle-aged patients with outcomes of death, and 25 (75,76%) was a survivor (Table 1). As given in Figure 1, 100% (31 cases) of patients submitted to chest tomography on hospital admission. In the findings of chest CT images, ground-glass opacity was 6 (19.4%) had < 25% pulmonary involvement in a typical pattern for SARS-COV 2 pneumonia, 9 (29.0%) had 25-50%, 8 (25.8%) had 50-75 % and 2 (6.5%) had very severe impairment > 75%; The remaining 6 cases (19.4%) did not follow the radiological pattern.

## DISCUSSION

In the present study, the results suggest that co-infection with HIV is associated with an increased risk of hospital admission in people with COVID-19. These patients who were hospitalized showed a decay saturation restored with O2 supply with a nasal O2 cannula under oxygen at 2 ~8 L/min. The clinical presentation in these patients is including fever, cough, anosmia, and digestive disorders (Wang, 2019). The most common types of comorbidities in HIV-positive patients and SARS-CoV-2 were hypertension, obesity, and diabetes (Oliveira Wanderson Kleber de, 2021). Indeed, our study showed multimorbidity (hypertension and diabetes). Our study showed a radiological finding CT in patients of COVID-19 HIV/AIDS coinfection pneumonia demonstrates bilateral, peripheral, and basal predominant exhibit high values in 25-50 % ground-glass opacities. Several authors related that HIV-1-infected patients receiving ART may have a lower risk of SARS-CoV-2 and its associated complications, due to the in vitro activity of some antiretroviral drugs against SARS-CoV-2 and their defective cellular immunity (Liu, 2020; Llen, 2010 and Panicek, 1989). Several studies have a correlation between COVID-19 mortality and HIV/AIDS coinfection. In literature, studies showed a higher proportion of deaths among HIV—SARS-CoV-2 coinfecting patients, due to higher multimorbidity, therefore, more severe forms of infection (Panicek, 1989; Cantini, 2020 and Dauby, 2020). However, HIV was not associated with an increased risk of death or of developing the severe disease in our study. Consequently, our findings data suggest that the main risk factors for mortality are related to advanced age and multimorbidity.

## CONCLUSION

Findings suggest that patients with HIV have an increased risk of hospital admission. Although did not show an association between HIV infection and an increased risk of death or of developing the severe disease in patients with COVID-19, especially in Hospital Ronaldo Gazolla outcome is survival for these patients.

**Conflict of interest:** The authors declare no conflicts of interest.

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