

COMPARATIVE ASSESSMENT OF THE NUMBER AND IMMUNOLOGICAL STATUS OF NEWLY DIAGNOSED AND RE-ENROLLED IN CARE HIV+ IN THE PERIOD 2018–2019 AND 2020-2021

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ABSTRACT

BACKGROUND: HIV infection has not been shown to be an individual risk factor, but people living with HIV and co-morbidities are at increased risk of severe COVID-19. For HIV+ individuals with severe immunosuppression and/or uncontrolled viremia, the prognosis for the course and outcome of COVID-19 remains serious. HIV infected with low CD4+ T-cell counts before antiretroviral therapy (ART) had a higher risk of complications from COVID-19 than those with higher CD4+ T-cell counts.

The aim of the study is to make a comparative assessment of the number and immunological status of newly registered and re-enrolled in care people living with HIV in the period 2018-2019 and 2020-2021 and to look for a correlation with COVID-19 pandemic.

MATERIALS AND METHODS: The study included all people living with HIV, monitored at the Clinic of Infectious Diseases and Parasitology, "St. George"

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University Hospital - Plovdiv both newly diagnosed and re-enrolled in care. Patients were divided into two groups: (1) Evaluated between 01.01.2018 and 31.12.2019 and (2) between 01.01.2020 and 15.10.2021. For the purposes of the study, methods of epidemiological and clinical analysis, ELISA, Western Blot for the diagnosis of HIV/AIDS and flow cytometry for the determination of T-cell populations were used.

RESULTS: For the period 2018-2019, there were 82 newly diagnosed and 29 re-enrolled in care HIV + patients. In 42,5% (35/82) of the newly diagnosed the number of CD4 cells was over 350 cells/ μ l, in 19,5% (16/82) - between 200 and 350 cells/ μ l, in 7% (6/82) - between 100 and 200 cells/ μ l and in 31% (25/82) below 100 cells/ μ l. In 24% (7/29) of the re-enrolled the number of CD4 cells was above 350 cells/ μ l, in 7% (2/29) - between 200 and 350 cells/ μ l, in 21% (6/29) - between 100-200 cells/ μ l and in 48% (14/29) - below 100 cells/ μ l. For the period 2020-2021, there were 63 newly diagnosed and 34 re-enrolled in care HIV + patients. In 46% (29/63) of the newly diagnosed the number of CD4 cells was over 350 cells/ μ l, in 21% (13/63) - between 200 and 350 cells/ μ l, in 14% (9/63) - between 100 and 200 cells/ μ l and in 19% (12/63) - below 100 cells/ μ l. In 30 % (10/34) of the restarted, the number of CD4 cells was over 350 cells/ μ l, in 11% (4/34) - between 200 and 350 cells/ μ l, in 15% (5/34) between 100 and 200 cells/ μ l and in 44% (15/34) of patients - less than 100 cells/ μ l

IN CONCLUSION: During the period 2020-2021, 10% fewer new HIV + patients were registered as compared to the period 2018-2019. The late presenters, with CD4 <350 cells/ μ l were 58% in the period 2018-2019 vs. 54% in the period 2020 -2021. The late presenters with advanced immune deficiency (CD4 <100cells / μ l) were respectively 31% and 19%. The proportion of those re-enrolled in care with advanced immune deficiency (CD4 <100/ml) was 48% in the first group and 44% in the second group, respectively. The lower number of newly diagnosed HIV + patients could be explained with the fear of visiting hospitals, testing getting infected with SARS CoV-2. According to our data, Covid-19 pandemic did not significantly affect the immune status of people living with HIV .

KEYWORDS: HIV/AIDS, COVID-19, Late presenters.

INTRODUCTION

HIV remains a major global health problem, with 79.3 million people HIV infected since 1981, of whom 39 million have died (1). In 2020, there were 37.7 million

people living with HIV (PLWH), 1.5 million new HIV infections and 680,000 deaths from AIDS. A total of 27.5 million PLWH were on ART (73%) (1). Globally, the number of new HIV infections has been decreasing by 23% each year since 2010, but this decline is not the same for the different geographic regions (2). According to the World Health Organization (WHO), in 2020 the number of PLWH in the European region was 2.6 million (3). The number of newly diagnosed HIV+ in the WHO European Region has increased by 19% over the last decade, while the number of newly diagnosed HIV+ among the European Union /European Economic Area (EU/EEA) countries has decreased by 9% over the same period (4). In 2019, over 53% of the newly diagnosed were late-presenters, with CD4 absolute count (AC) below 350 cells / μ l, the highest share of late presenters being registered in Central and Eastern European region (4). As late presenters, late presenters with advanced or with very advanced immune deficiency are defined PLWH who have been diagnosed, respectively, with CD4 AC <350 cells / μ l, CD4 <200 cells / μ l and CD4 <50 cells / μ l or with AIDS-defining disease, independent of CD4 AC (5, 6, 7). In clinical practice, there are two groups of late presenting PLWH : (1) Those tested, and diagnosed for the first time late and (2) Those who have discontinued treatment and follow-up for months / years and have reappeared to restart ART (5, 6, 7). The COVID-19 pandemic has caused serious disruptions in the functioning of health systems in

many countries, restricting population movements and making health care very difficult (8). In some countries, up to 75% of care activities for PLWH have been reported to drop out (8).

The aim of the work was to make a comparative assessment of the number and immunological status of newly registered and re-enrolled in care PLWH in the Plovdiv region, in the periods 2018-2019 and 2020-2021, in order to assess the impact of COVID-19 pandemic on early diagnosis and adherence to ART.

MATERIALS AND METHODS

The study included PLWH monitored at the Clinic of Infectious Diseases of the University Hospital "St. Georgi"-Plovdiv, for a period of 4 years (01.01.2018–15.10. 2021) both newly diagnosed and re-enrolled in care. The patients were divided into two groups: pre-pandemic, p from 01.01.2018 to 31.12.2019 and, pandemic, from 01.01.2020 to 15.10.2021. For the purposes of the study were used: methods of epidemiological and clinical analysis, ELISA, and Western Blot for HIV diagnosis and flow cytometry for determination of CD4 AC..

RESULTS AND DISCUSSION

The dynamics of PLWH monitored at the Clinic of Infectious Diseases for the last 4 years was as follows: during 2018-2019 there were 82 newly diagnosed and 29 re-enrolled in care.; during 2020-2021, there were 63 newly diagnosed and 34 re-enrolled in care. (Figure 1).

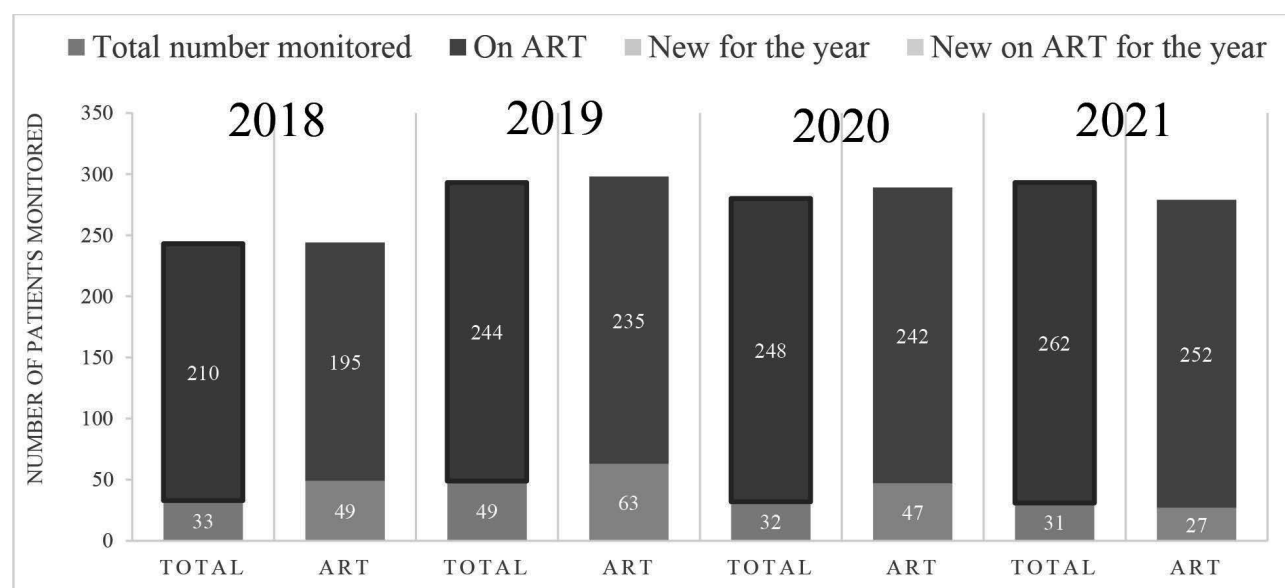


Figure 1. Dynamics of HIV+ patients monitored at the Clinic of Infectious Diseases for a period of 4 years.

For the period 2018-2019 in 42.5% (35/82) of the newly diagnosed the number of CD4 cells was over 350 cells/ μ l, in 19.5% (16/82) from 200-350 cells / μ l, in 7 % (6 /82) - from 100 to 200 cells / μ l and at 31 % (25/82) below 100 cells / ml. In the period 2020-2021 in 29% (29/63) of the newly diagnosed the number of CD4 cells is over 350 / μ l, in 21% (13/63) - from 200-350 cells / μ l, in 14% (9/63) from 100 to 200 cells / μ l and in 19% (12/63) below 100 cells / μ l (Figure 2).

For the period 2018-2019 in 24% (7/29) of the re-enrolled in care the number of CD4 cells was over 350 cells / μ l, in 7% (2/29) from 200-350 cells / μ l, in 21% (6/29) - from 100-200 / μ l and at 48% (14/29) below 100 cells / μ l. In the period 2020-2021 in 30% (10/34) of the re-enrolled the number of CD4 cells was over 350 / μ l, in 11% (4/34) - from 200-350 / μ l, in 15% (5/34) of 100-200 cells / μ l and in 44% (15/34) of patients - less than 100 cells / μ l (Figure 3).

The number of hospitalizations, deaths and weight loss syndrome associated with HIV were more

common among the newly diagnosed and restarted ART patients with immune deficiency, (CD4 <350 cells / μ l, as compared to patients with CD4 above 350 c / μ l, with no significant differences between the two observation periods. Cases of COVID-19 were observed equally in all patients, regardless of CD4 AC (Figures 4 and 5). The same trend was observed for coinfections with viral hepatitis B and C, and for opportunistic infections - tuberculosis and candidiasis (Figures 6, 7, 8 and 9).

IN CONCLUSION:

The number of newly diagnosed PLWH in the period 2020-2021 was 10% less as compared to the period 2018-2019. In the period 2018-2019, the late presenters (with CD4 <350 cells/ μ l) were 58%, and 31% of them were with advanced immune deficiency and CD4 <100 cells/ μ l. In the pandemic period 2020-2021, the late presenters were 54%, and 19% of them were with advanced immune deficiency (CD4 <100 cells/ μ l). The relative share

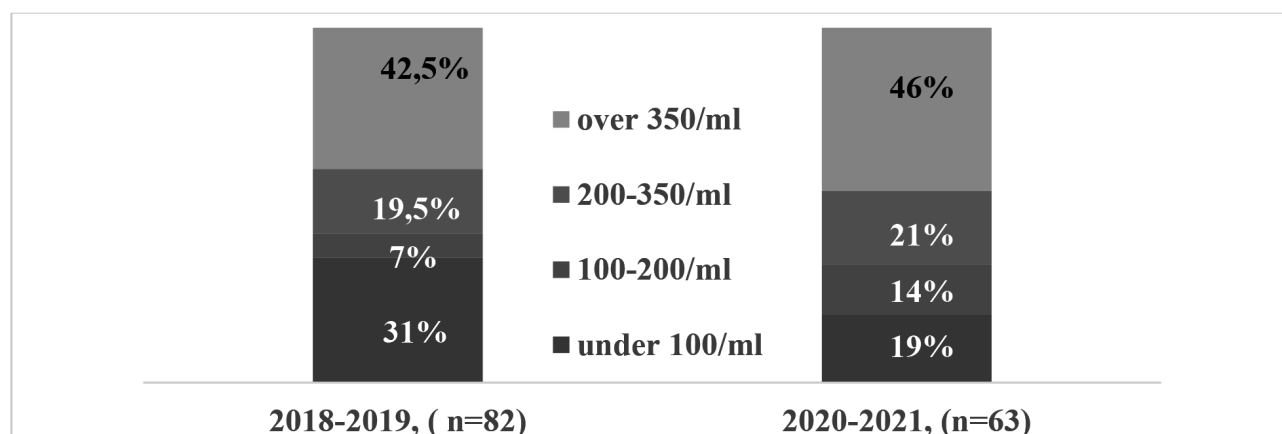


Figure 2. Immune status (CD4 cells / μ l) of newly diagnosed HIV+ patients for the period 2018 - 2019 and 2020 - 2021.

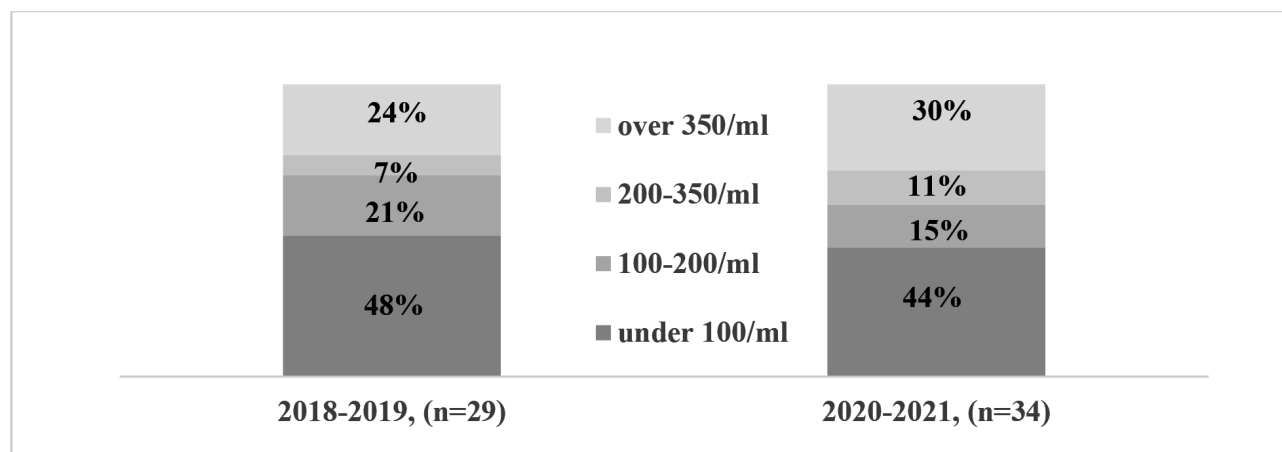


Figure 3. Immune status (CD4 cells / mm3) of restarted ART patients for the period 2018 - 2019 and 2020 - 2021.

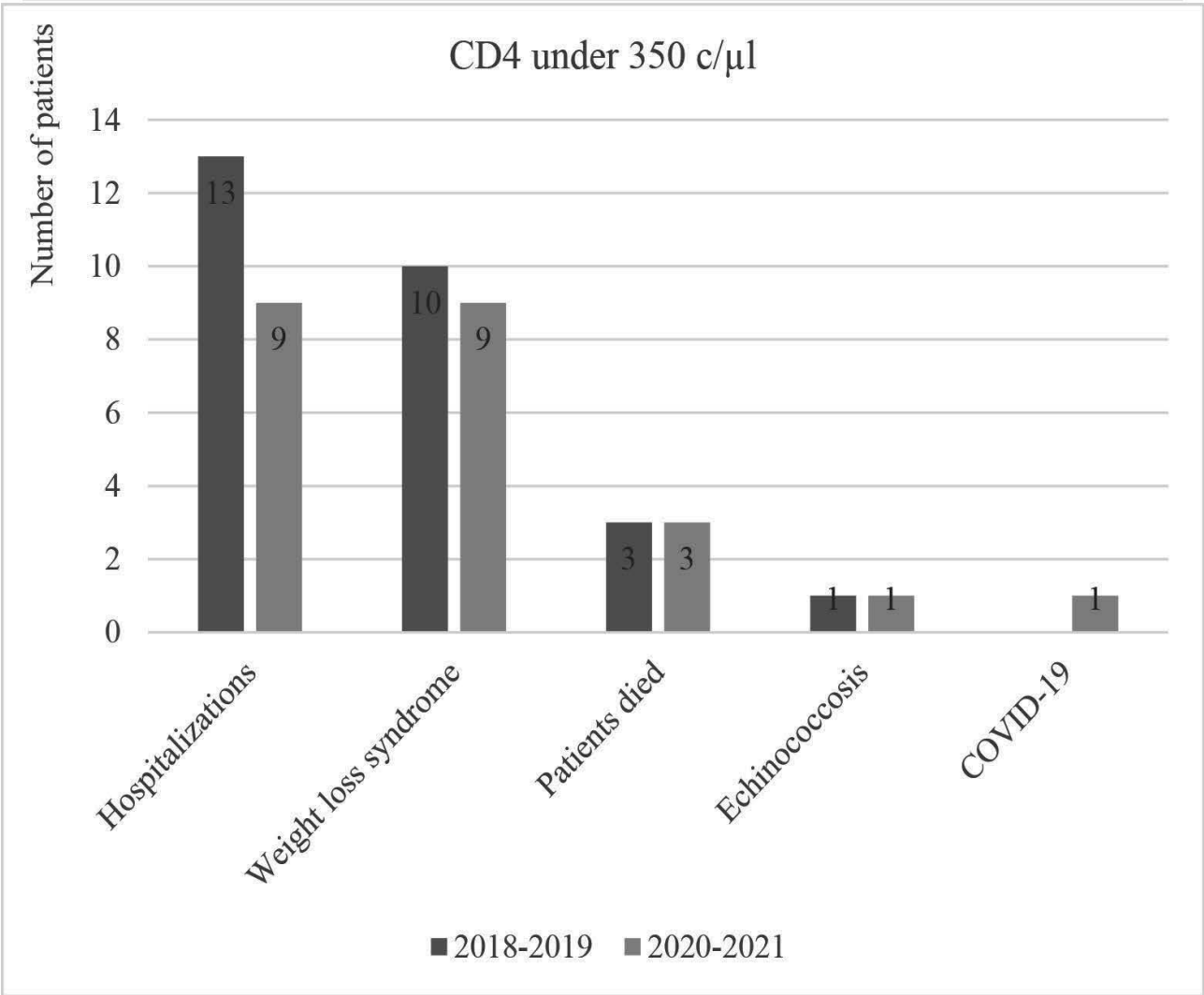
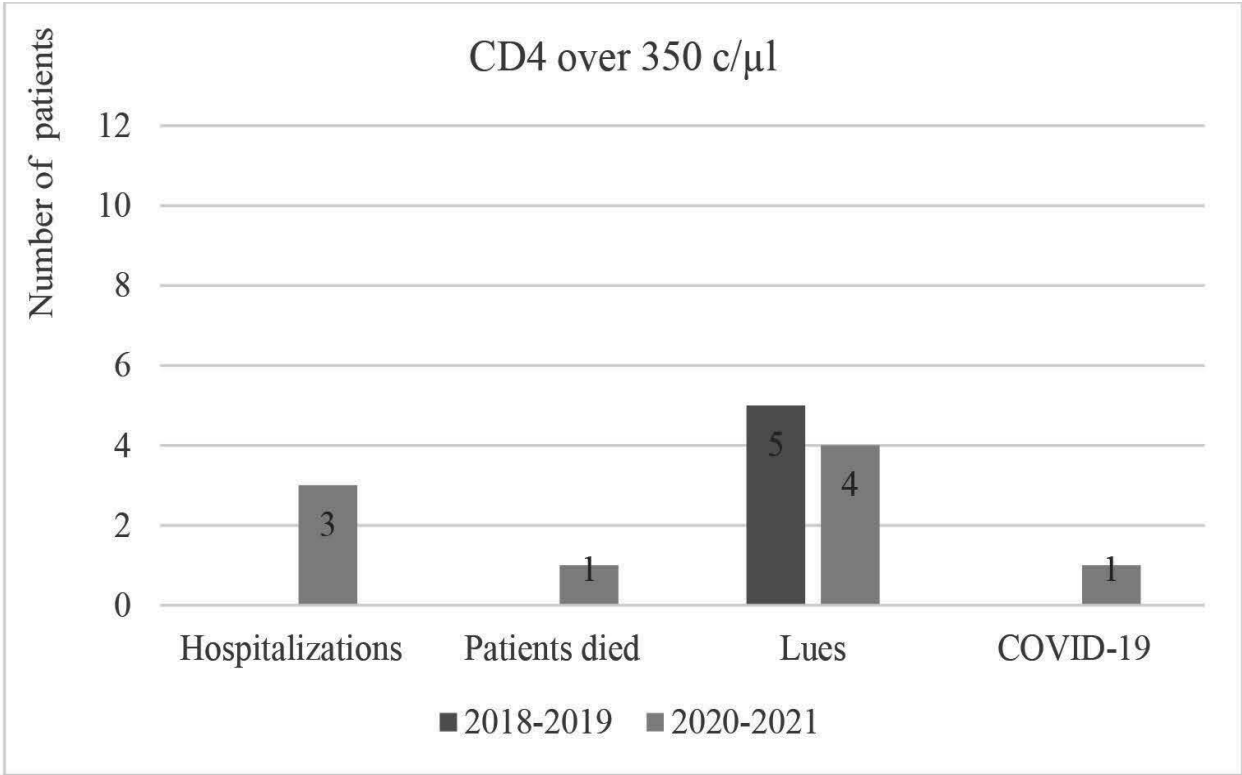


Figure 4. Comorbidity, hospitalization and fatal outcome in newly diagnosed HIV patients for the period 2018 - 2019 (n = 56) and 2020 - 2021 (n = 28).

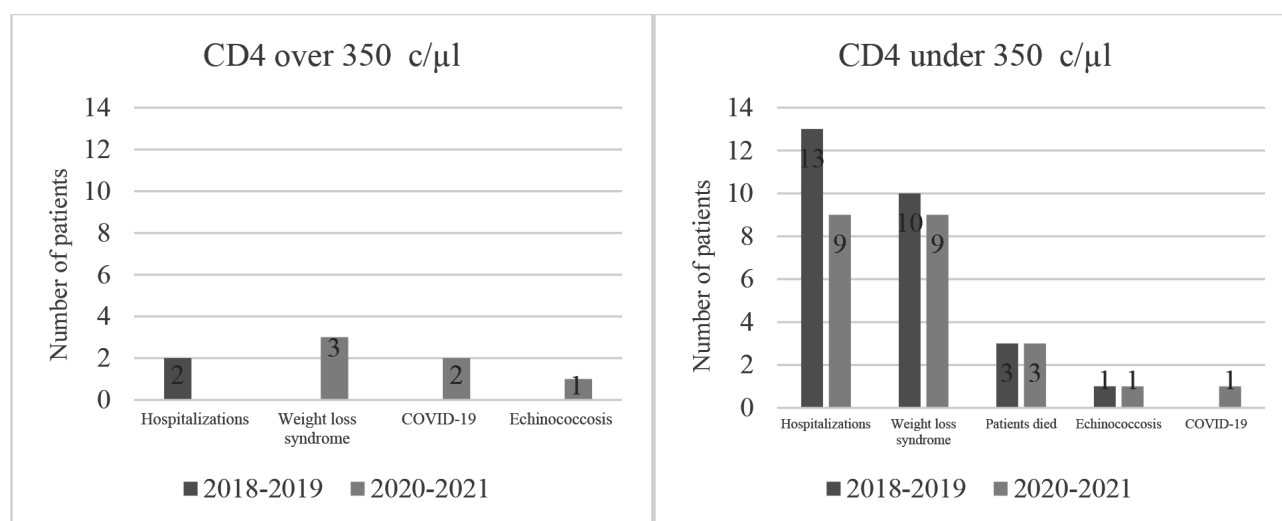


Figure 5. Comorbidity, hospitalization and fatal outcome in patients restarted on ART for the period 2018 - 2019 (n = 29) and 2020 - 2021 (n = 29).

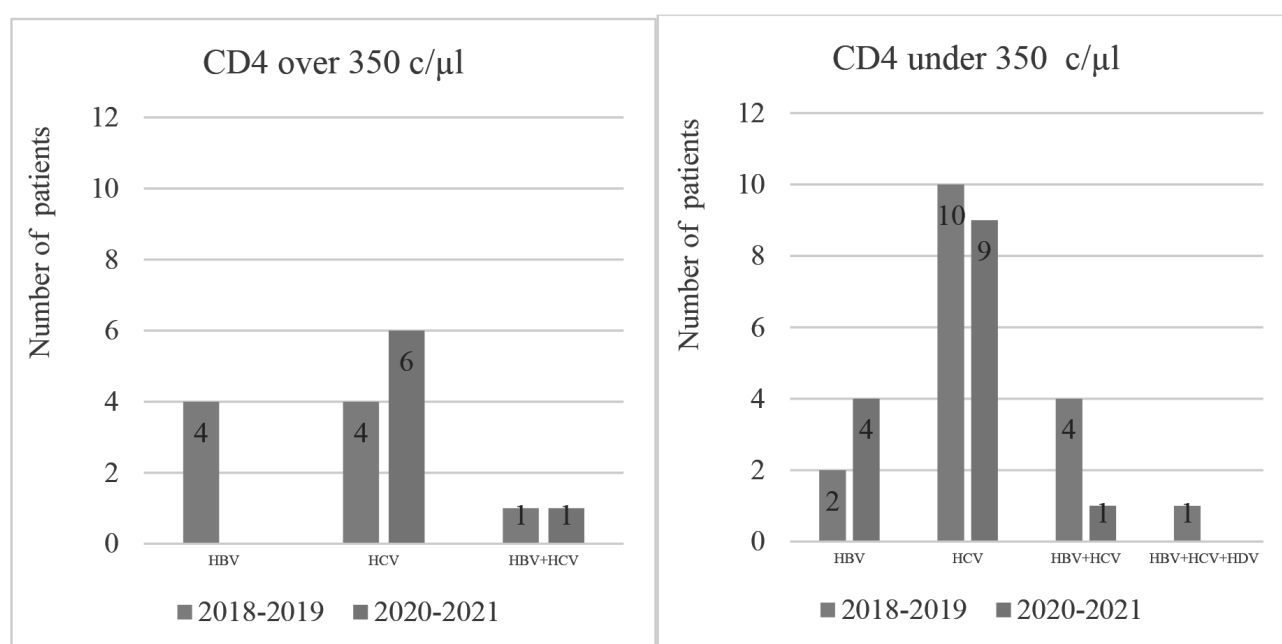


Figure 6. HIV / viral hepatitis co-infections in newly diagnosed patients for the period 2018 - 2019 (n = 26) and 2020 - 2021 (n = 21).

of PLWH re-enrolled in care with advanced immune deficiency (CD4 <100 cells/ μl) is alarmingly high, 48% in the first group and 44% in the second group. It can be assumed that the lower number of newly diagnosed in the period 2020-2021 was due to , the fear of visiting hospitals and the fear of SARS CoV2 during the COVID-19 pandemic. The relative share of HIV + patients re-enrolled in care with advanced immune deficiency was alarmingly high, and this finding requires additional efforts to improve the adherence to treatment. A limitation of the study is the small number of patients in the two studied time periods matched by individual

indicators, which does not allow to assess the statistical significance of the differences.

COMPETING INTERESTS

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

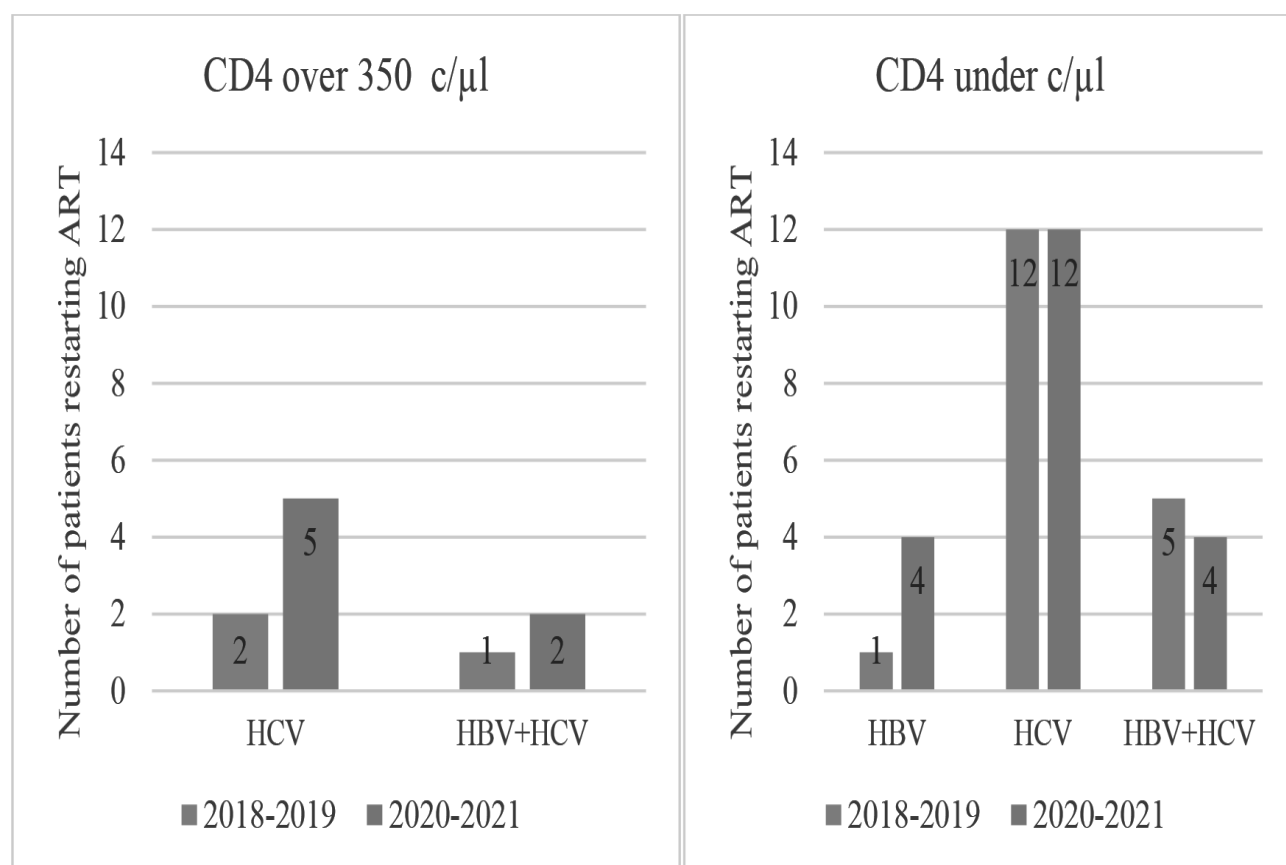


Figure 7. Co-infection of HIV with viral hepatitis in patients restarted on ART for the period 2018 - 2019 (n = 21) and 2020 - 2021 (n = 27).

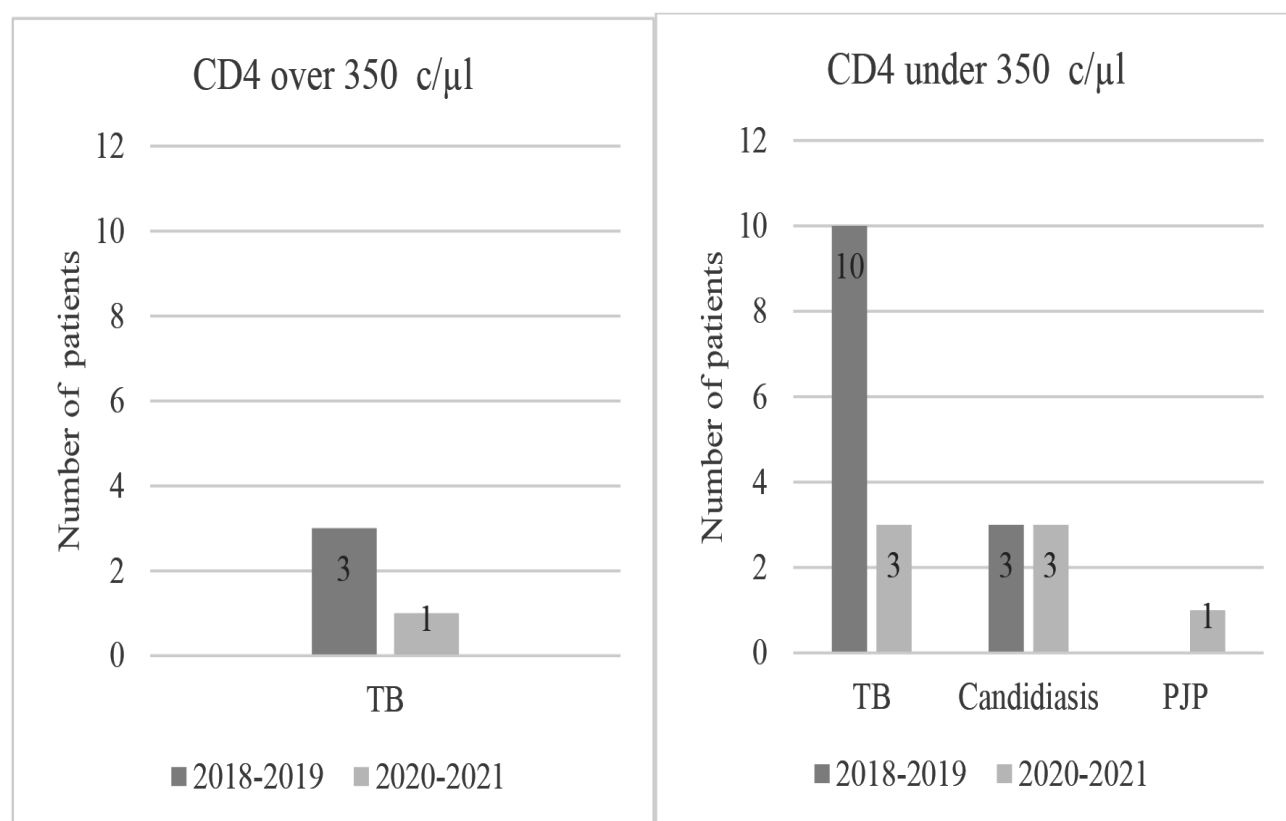


Figure 8. HIV and opportunistic infections in newly diagnosed patients for the period 2018 - 2019 (n = 16) and 2020 - 2021 (n = 8).

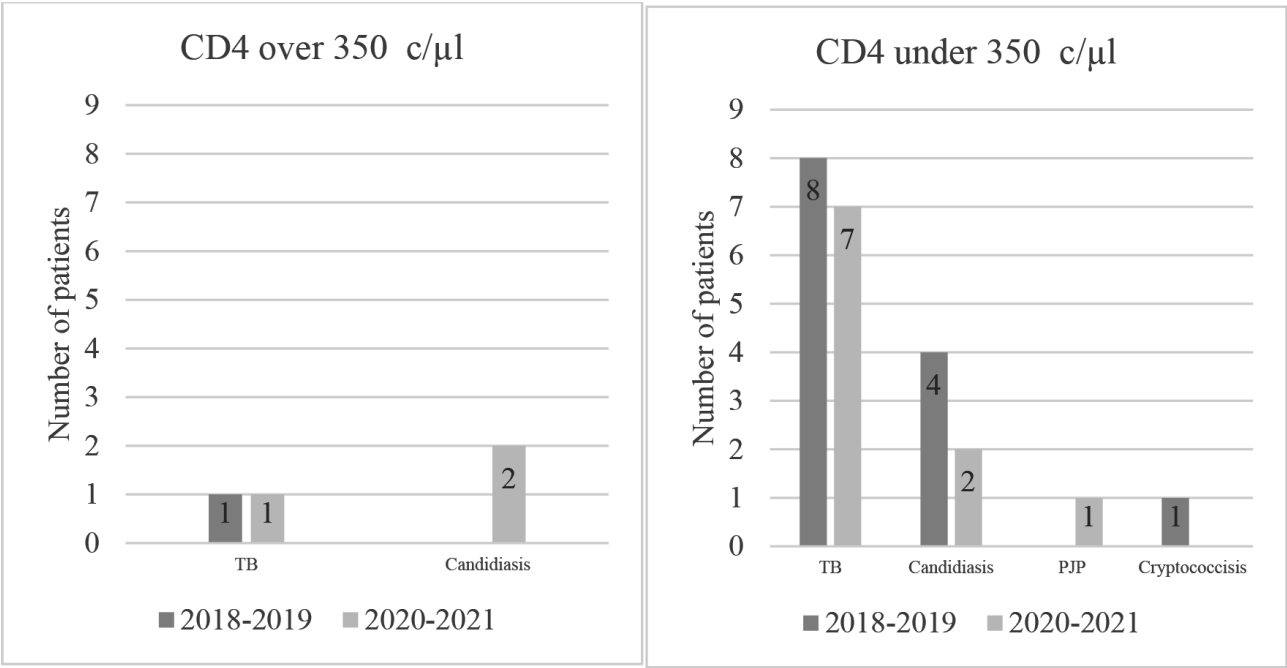


Figure 9. HIV and opportunistic infections in patients restarted on ART for the period 2018 - 2019 (n = 14) and 2020 - 2021 (n = 13).

DECLARATION OF AUTHORSHIP

Authors (PV, TV, IB, MS) participated in the design, organization, and implementation of the study. MS gave the idea of presenting the clinical case and guided the project. All authors (PV, TV, IB, MS) contributed writing the second and final draft. All authors approved the final draft.

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