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What Impact Has the COVID-19 Pandemic Had on the Profile of HIV/Tuberculosis Co-Infection?

M. Er-Rejrragi[1*], R. El Fargani[1], W. Ait Driss[1], M. Idalene[1], N. Tassi[1]

[1]Department of Infectious Diseases -CHU Mohammed VI-University Cadi Ayyad, Marrakech, Morocco

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***Corresponding author:** M. Er-Rejrragi
Department of Infectious Diseases -CHU Mohammed VI-University Cadi Ayyad, Marrakech, Morocco

Abstract **Original Research Article**

***Introduction*:** The COVID-19 pandemic has had a significant impact on many aspects of public health, including the management of co-infections such as tuberculosis and HIV. ***Objective*:** determine the impact of the COVID-19 pandemic on the incidence, time to diagnosis and profile of HIV/Tuberculosis co-infection. ***Methods*:** Retrospective descriptive study conducted from January 2017 to May 2023 including all new patients living with HIV (PLHIV) admitted to the Infectious Diseases Department of the Mohammed VI University Hospital of Marrakech during three periods: pre-COVID (2017-2019), per-COVID (2020-2021) and post-COVID (2022-May 2023). ***Results*:** In our study, the incidence of HIV infection increased markedly during the post-COVID period compared with the pre-COVID and per-COVID periods: 157.3 cases/year, 123 cases/year and 88.5 cases/year respectively. We also noted a delay in the diagnosis of HIV infection during the per-COVID period, explaining the evolution of HIV infection to stage C. In addition, the incidence of tuberculosis increased markedly during the post-COVID period, with a predominance of multifocal and severe forms, explained by the delay in diagnosis due to confinement. Our study thus shows the negative impact of the pandemic on the diagnosis and prognosis of HIV/TB co-infection. ***Conclusion*:** HIV/Tuberculosis co-infection was profoundly affected by the COVID-19 pandemic, highlighting the shortcomings of existing healthcare systems and the need to strengthen the resilience of public health programmes to deal with multiple simultaneous crises. The lessons learned from this period can guide future efforts to improve the integrated management of infectious diseases and strengthen the resilience of global health systems.

Keywords: Multifocal Tuberculosis, TB/HIV Co-Infection, COVID-19.

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INTRODUCTION

COVID-19, an infection caused by the SARs-CoV-2 virus, was declared a pandemic in March 2020 by the World Health Organisation (WHO). This event, of catastrophic proportions, has affected millions of families, with major social repercussions, particularly in relation to the worsening of social inequalities, accentuating global public health problems, including the control of tuberculosis (TB), which is the leading cause of death from a single infectious disease in the world. It has also disruptions in the management of other diseases during the period of total containment, in particular infection with the human immunodeficiency virus (HIV) [1].

HIV infection represents a major challenge for the control of tuberculosis infection. Tuberculosis (TB) is the leading opportunistic infection in people living with HIV (PLHIV), who are 18 times more likely to develop progressive TB than people without HIV infection. Moreover, TB causes more deaths in PLHIV than any other infectious disease, accounting for a third of all deaths in these patients. The fight against TB/HIV co-infection involves early detection, accurate diagnosis, appropriate treatment and prevention of transmission of both TB and HIV [1].

In 2023, a total of 1.25 million people died from TB, 161,000 of whom were also infected with HIV. Globally, TB is likely to have returned to being the leading cause of death after coronavirus 2019 (COVID-19) had occupied this position for the previous three years [1].

In Morocco, according to WHO estimates for 2022, 1.2% of TB cases (410 cases) and 2.7% of TB deaths (73 deaths) are HIV-positive. A national survey carried out in 2008 on the prevalence of HIV seropositivity among TB patients revealed a national rate of 1.7% and a regional rate of up to 8.2% in the Souss-

Massa region. National data from HIV screening activities among TB patients confirm the results of the HIV seroprevalence survey mentioned above. The HIV seropositivity rate among TB patients whose HIV status is known varies between 1.4% and 1.9% between 2016 and 2022 (Figure 1). Of the 266 patients with TB/HIV co-infection notified in 2022, 58% had a known positive HIV status prior to TB diagnosis and 42% were found to be HIV positive following routine HIV screening of TB patients [2].

METHODS

We conducted a retrospective descriptive and comparative study covering the period from January 2017 to May 2023, including all HIV patients admitted to the Infectious Diseases Department of the Mohammed VI University Hospital in Marrakech, spread over three periods: pre-COVID (P1) between 2017 and 2019, per-COVID (P2) between 2020 and 2021, and post-COVID (P3) between 2022 and May 2023. We recruited all HIV/TB co-infected patients, regardless of the location of the tuberculosis (pulmonary or extra-pulmonary), confirmed or retained on the basis of clinical, bacteriological, radiological and histological evidence. We used Excel software for our statistics.

RESULTS

We recruited 782 new patients living with HIV (PLHIV), 154 of whom were co-infected with HIV and tuberculosis. The majority of our patients were male (sex ratio = 2.01) with a mean age of 35.5 years. The incidence of HIV infection increased considerably in the post-COVID period, reaching 157.3 cases per year, compared with 123 cases per year in the pre-COVID period and 88.5 cases per year in the per-COVID period. The mean time to diagnosis of tuberculosis was slightly longer in the per-COVID period (3.1 months), 2.24 months in P1 and 2.31 months in P3 [Figure 1]. The mean CD4 count was lower per-COVID, at 107/mm3 in P2, 132/mm3 in P1 and 165/mm3 in P3 respectively. The number of HIV/tuberculosis co-infected patients was significantly higher in P3 (72 cases, or 30.55%) than in P2 (32 cases, or 18.55%) and P1 (50 cases, or 13.55%) [Figure 2]. In addition, the incidence of tuberculosis rose sharply in the post-COVID period, with multifocal and severe forms predominating in 54.2% of cases. The death rate also increased during and after the COVID period (2.46% vs. 1.35%) [Table 1].

Table 1: Epidemiological and clinical characteristics of tuberculosis/HIV co-infection during the pre- COVID, per-COVID and post-COVID periods

Period		Pré-COVID (P1)	Per-COVID(P2)	Post-COVID(P3)
Middle age		34,71	36,35	35,59
Sex ratio M/F		1,38	2,53	2,14
Stade C		39(10,5%)	30(17%)	35(15%)
Average CD4		132	107	165
Death rate		1,35%	2,82%	2,11%
Total		369	177	236
Incidence cas/an		123	88,5	157,3
Co-infection of HIV/Tuberculosis		50(13,55%)	32(18,55%)	72(30,55%)
Diagnostic delay of Tuberculosis		2,24	3,1	2,31
Location	Pulmonary	19(38%)	9(28,2%)	15(20,8%)
	Extra-Pulmonary	17(34%)	7(21,8%)	18(25%)
	Pulmonary and extra	14(28%)	16(50%)	39(54,2%)

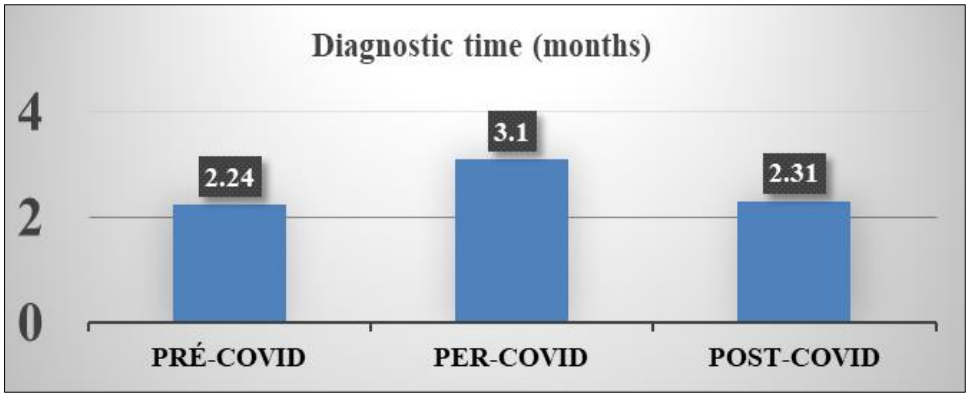

Figure 1: Average time taken to diagnose tuberculosis (in months), by time period

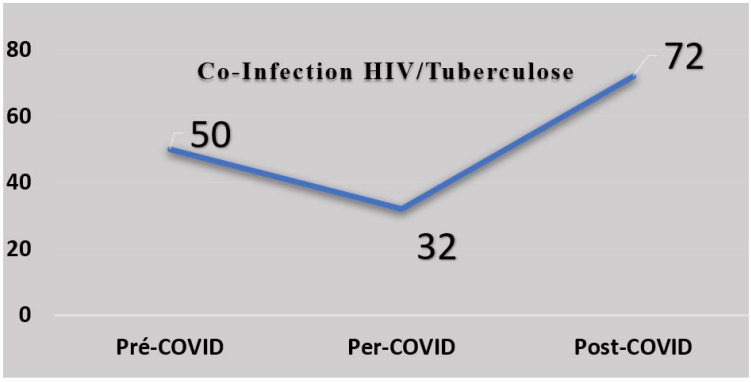

Figure 2: Number of cases of HIV/TB co-infection during the three periods (pre-COVID, per-COVID, post- COVID)

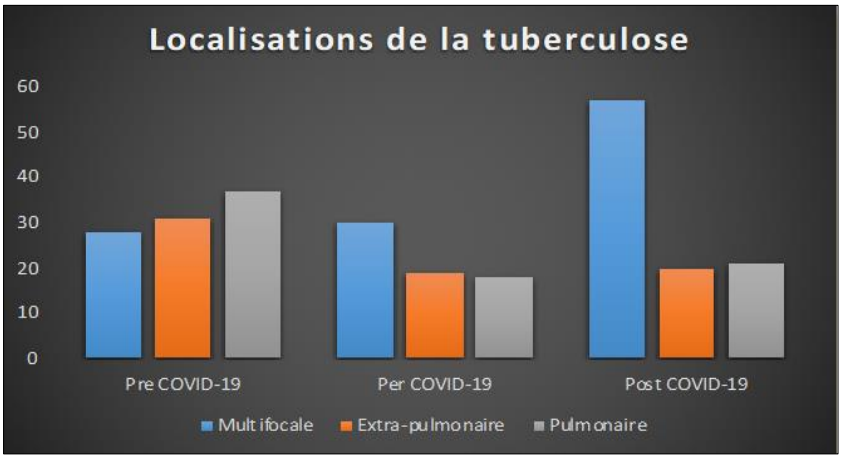

Figure 3: Breakdown of the number of cases by tuberculosis site

DISCUSSION

The COVID-19 pandemic has had a major impact on various aspects of public health, including the management of co-infections such as tuberculosis (TB) and HIV. Containment measures, reallocation of resources and fear of contracting COVID-19 have significantly reduced access to essential health services, including screening and treatment for TB and HIV [1].

Screening and diagnostic services for tuberculosis and HIV have been disrupted, leading to a drop in the number of people screened and diagnosed. In addition, many infected patients have experienced difficulties in accessing their antiretroviral (ARV) drugs on a regular basis [1].

Travel restrictions and the saturation of health services have made it difficult for TB and HIV patients to receive regular medical follow-up and maintain their adherence to treatment.

It is likely that the pandemic has led to an increase in delays in the diagnosis of TB and HIV, as well as interruptions in treatment. This could lead to an increase in complications and deaths related to these infections [3]. This is consistent with our results.

In our study, the incidence of HIV infection increased significantly in the post-COVID period compared with the pre-COVID and per-COVID periods. A delay in the diagnosis of HIV infection was also observed during the per- COVID period. In addition, the incidence of tuberculosis increased markedly during the post-COVID period, with a predominance of multifocal and severe forms, which can be explained by the diagnostic delays associated with confinement [Figure 3]. These results illustrate the negative impact of the pandemic on the diagnosis and prognosis of HIV/tuberculosis co-infection.

The most visible impact of the disruption caused by the COVID-19 pandemic on TB control is a sharp global decline in the number of people newly diagnosed in 2020, compared with 2019 [3]. Indeed, after large increases in this number between 2017 and 2019, there waś a net fall of 18% between 2019 and 2020 (from 7.1 to 5.8 million) [2]. In the African region, the decline waś much more modest (2.5%) This suggests that TB case detection and notification in this region were alsó affected by the COVID-19 pandemic [2]. After a sustained reduction in global TB deaths between 2015 and 2019 [1], 2020 markeá a clear reversal with the number increasing again. The latter is now estimated at 1.3 million in HIV-negative people (compared with 1.2 million in 2019), and 214,000 in HIV-positive people

(compared with 209,000 in 2019) [3]. In our series, the death rate increased during and after covid 19 compared with the pre-COVID period (2.46% vs 1.35%).

Traditional barriers to accessing antiretroviral treatment were exacerbated by the COVID-19 pandemic. Travel restrictions made access to care more difficult, while resources available during the containment period, such as personal protective equipment (gloves, masks, disinfectants) and screening tests, were limited. These difficulties also complicated relations between healthcare professionals and patients, hampering the quality of care [4, 5].

In addition, the pandemic has had a psychological impact on many patients living with HIV, particularly women and young adults aged between 20 and 24 [6].

Nevertheless, despite the challenges faced by people living with HIV at the start of the pandemic, alternative measures have been put in place. The distribution of a six-month supply of antiretroviral treatment (ART) has encouraged adherence to treatment, enabled patients to return early and reduced delays in consultations [7]. This is also the case in our centre and throughout the country, where the delivery of triple therapy to people living with HIV has been maintained thanks to the support of the Association de lutte contre le Sida (ALCS).

The decline in TB screening and diagnosis has been attributed to a reduction in the influx of patients to health centres. In addition, the operation of TB services was disrupted, sometimes leading to reduced involvement of community health workers in the early diagnosis of TB, which has been reported in other studies [8]. The management of patients with suspected or confirmed tuberculosis infection has also been disrupted by the epidemic situation, leading to a drop in adherence to treatment and cure rates, as well as a significant increase in resistance to anti-tuberculosis treatments, due to successive treatment discontinuations [9].

The SARS-CoV-2 pandemic has imposed confinement in order to limit the spread of the virus, profoundly disrupting the economic, social and spiritual life of the population. It is crucial to assess the impact of this situation on patients living with HIV, who may have difficulty accessing care and treatment for their illness in this context. This assessment will provide a better understanding of the current challenges and enable strategies to be put in place to prevent such incidents in the future, while ensuring the continuity of HIV treatment services in line with the UNAIDS 95-95-95 strategy [10].

CONCLUSION

The COVID-19 pandemic has had a profound impact on the management of HIV/tuberculosis co-infection, exacerbating existing challenges for people living with these two infections. Health restrictions, lockdowns and overloaded healthcare systems have disrupted access to care, leading to delays in diagnosis and treatment, which has worsened the health status of patients. In addition, the prioritisation of efforts against COVID-19 has often put tuberculosis and HIV programmes on hold. Disruptions in the drug supply chain have limited access to antiretroviral (ARV) and anti-tuberculosis treatment, increasing the risk of treatment resistance for both diseases.

The COVID-19 pandemic has also exacerbated the challenges associated with TB-HIV co-infection, highlighting the vulnerabilities of the populations most affected. Strengthening healthcare systems and ensuring continued access to care are essential to prevent these co-infections from worsening, particularly in future crises. We hope that this work will help to support further studies and the implementation of public policies aimed at combating these two diseases.

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