Opportunistic infections in people living with HIV in the infectious diseases department of the University Hospital of Fann in Dakar, Senegal

ABSTRACT

The aim of this study was to identify the main infections and opportunisticinfections in hospitalized patients living with HIV and to determine the hospital lethality rate.

Patients and method This was a retrospective, descriptive study of patients hospitalized in the infectious diseases department of the University Hospital of Fann over a 02-year period from 1 January 2021 to 31 December 2022.

Results

We recorded 308 cases, 296 of which were patients living with HIV, out of a total of 1208 patients admitted to the department, a hospital prevalence rate of 24.5%. The average age of the patients was 43.3 ± 13.3 years, with a sex ratio of 0.7. One hundred and thirty-one patients (44.26%) were married.22.97% had no occupation and 35.5% of patients came from home. The average diagnostic period was 3.9 days ± 4.78 days. Two hundred and five patients (69.26%) were at WHO stage 4. Tuberculosis was the most common bacterial infection, with 114 cases (38.5%), followed by common bacterial pneumonia (7.77%) and septicemia (4.72%). With regard to viral infections, the prevalence of viral hepatitis B was 6.76%, followed by herpes (1.68%). Among parasitic infections, toxoplasmosis was noted in 6.41% and cryptosporidiosis in 2.02%. Candidiasis was the most common fungal opportunistic infection, affecting forty-three patients (14.52%), followed by pneumocystis (7.09%) and cryptococcosis (2.36%**).** More than a third of our patients (37.84%) had severe anaemia, with haemoglobin levels below 8g/dl. Nearly a quarter of patients (21.28%) had impaired kidney function.

Conclusion

HIV infection occurs in young adults at a late stage.Mortality remains high due to opportunistic infection. it is essential to carry out early screening, but above all to make available diagnostic tools and certain molecules for treatment of opportunistic infections

Keywords: opportunistic infections, HIV, lethality, Dakar

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1. INTRODUCTION

The human immunodeficiency virus (HIV) is a retrovirus that infects humans and causes acquired immunodeficiency syndrome (AIDS), a weakened state of the immune system that makes people vulnerable to multiple opportunistic infections **[1]**. HIV infection remains a major public health problem worldwide **[2]**. Since the peak in 2004, mortality has halved. In 2020, 680,000 people died of HIV-related causes worldwide, including around 500,000 in Africa **[3]**. According to estimates, the number of people living with HIV (PLHIV) in Senegal in 2020 was around 39,400 **[4]**. According to the data, the number of deaths due to AIDS dropped between 2021 and 2022, from 1,024 to 992, a reduction of 3.2% **[5]**. TCD4+ lymphocyte deficiency is a marker of progression of immune deficiency. This drop in immunity is at the root of opportunistic infections (OIs) and opportunistic diseases resulting from late screening, ignorance of HIV infection, denial of serological status, and poor compliance with antiretroviral treatment, which is at the origin of antiretroviral treatment failuredue to side effetc. These opportunistic infections are the direct cause of more than 80% of deaths in HIV-infected patients **[6]**. Although some drugs are available to combat these opportunistic infections, others are not yet available in our resource-limited countries **[6]**. In Senegal, test and treat, through the implementation of the Tatarsen strategy in the management of HIV infection, was initiated in 2016 and has been a good step forward in decentralized management. In this context, it would be appropriate to provide an overview of infections and opportunistic infections in patients living with HIV (PLHIV) hospitalized in the infectious diseases department of the of the University Hospital of Fann in. The aim of this study was to identify the main infections and opportunistic diseases in PLHIV hospitalized in the infectious diseases department of the Fann CHNU (University Hospital) and to determine the hospital lethality rate.

2. MATERIAL AND METHODS

This was a retrospective, descriptive study of patients hospitalized in the infectious diseases department of the of the University Hospital of Fann over a 02year period from 1 January 2021 to 31 December 2022. This study was conducted on the basis of the medical records of hospitalized patients infected with HIV and suffering from an opportunistic infections or disease. All patients living with HIV/AIDS hospitalized for the management of an opportunistic infections or disease were included in this study. Patients whose records were incomplete or whose progress during hospitalization was unknown, were not included. Data were collected from patients' medical records, hospitalization and treatment registers. Survey forms were filled in on the basis of the information collected, including epidemiological aspects (age, sex, marital status, geographical origin, occupation, comorbidities, area of origin, HIV profile, circumstances of discovery of serological status,) diagnostic aspects (reason for hospitalization, time to diagnosis, WHO clinical stage, diagnosis based on epidemiological, clinical and/or paraclinical elements,) therapeutic aspects (time to start treatment, molecules administered, ART,) evolutionary aspects length of hospitalization, complications and evolutionary modalities (death, cure, transfer).The data were entered using Excel and analysed using R 4.2.2 software. Quantitative variables were expressed as an average and standard deviation or median with extremes, and qualitative variables as absolute and relative frequencies. Confidentiality and patient anonymity were ensured.

3. RESULTS

Epidemiological aspects

During our study period, we recorded 308 cases, 296 of which were patients living with HIV, out of a total of 1208 patients admitted to the department, giving a hospital prevalence rate of 24.5%. The average age of the patients was 43.3 ± 13.3 years. The most representative age group was [25-45 years]. Of the 296 patients, 172 were women (58.1%), with a sex ratio of 0.7. One hundred and thirty-one patients (44.26%) were married, and 20.95% were single. The majority of our patients (83.44%) lived in Dakar. Occupation was not specified for a third of our patients and 22.97% were unemployed. High blood pressure was the most frequent comorbidity and was found in 20 patients (6.76%), followed by diabetes (4.05%) and asthma (3.38%). Among the patients, 88.14% had an HIV1 profile, and a dual profile (HIV1+HIV2) was noted in 13 patients (4.39%). Hospitalization was the circumstance in which HIV infection was discovered in 29.39% of patients, and in 5.74% a consultation was the point of entry into care. 35.5% of patients were referred from home. Alcohol consumption was noted in seventeen patients (5.74%) of our study population, and 31 patients were smokers (10.5%).

Diagnostic aspects

In our patients, 35.5% were hospitalized for impairment of general condition, followed by cough (30.1%), fever (26.7%) and disorder of consciousness (18.2%) **(Table 1)**. The average time to diagnosis was 3.9 days ± 4.78 days. Two hundred

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and five patients (69.26%) were at WHO stage 4. Regarding the different types of pathology in our patients, bacterial infections were the most common (168 patients or 56.74% of cases). Tuberculosis was the most common bacterial infection, with 114 cases (38.5%). Tuberculosis was found in the lungs in 105 cases (92.1%), followed by neuro-meningeal (29.82%) and lymph node (28.07%) involvement. Other bacterial infections were Common bacterial pneumonia (7.77%) and septicemia (4.72%) **(Table 2)**.With regard to viral infections, viral hepatitis B was found in 20 patients (6.76%), followed by herpes (1.68%). COVID-19 and herpes zoster were recorded in 1.35% of patients. Concerning parasitic diseases, toxoplasmosis was found in 6.41% of patients and cryptosporidiosis in 2.02%. Candidiasis was the most common fungal opportunist infection, reported in forty-three patients (14.52%), followed by pneumocystis (7.09%) and cryptococcosis (2.36%) **(Table 2)**. More than a third of our patients (37.84%) had haemoglobin levels below 8g/dl (severe anaemia). Nearly a quarter of patients (21.28%) had impaired kidney function.

Table 1: Reasons for hospital admission at the infectious and tropical diseases department, Fann Hospital, Dakar, 1 January 2021 to 31 December 2022

Reasons for hospital admission	Number of cases (n)	Percentage (%)
Deterioration in general condition	105	35.50
Cough	89	30.10
Fever	79	26.70
Impaired consciousness	54	18.20
Asthenia	39	13.20
Dyspnea	38	12.80
Clinical immunodepressionsyndrome	25	8.45
Motor deficit	18	6.08
Chest pain	17	5.74
Diarrhea	17	5.74
Lower limb oedema	14	4.73
Vomiting	12	4.05
Adenopathy	9	3.04
Ulceration (genital, oral)	9	3.04
Diffuse pain	8	2.70
Chills	6	2.03
Jaundice	4	1.35
Collapse	3	1.01

Table 2: Infections and opportunistic diseasesat the infectious and tropical diseases department, Fann Hospital, Dakar, 1 January 2021 to 31 December 2022

infections and opportunistlicdiseases		Number of cases (n)	Percentage (%)
Bacterial	Tuberculosis	114	38.50
	Common bacterial pneumonia	23	7.77
	Septicemia	14	4.72
	Meningoencephalitis/encephalitis	12	4.05

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	Malignant staphylococca of the face	2	0.68
	Salmonellosis	2	0.68
	Endocarditis	1	0.34
Viral	Viral Hepatitis B	20	6.76
	Herpes (cutaneous, genital)	5	1.68
	COVID-19	4	1.35
	Herpes zoster	4	1.35
	Molluscum contagiosum	1	0.34
	Progressivemultifocal leucoencephalitis	1	0.34
Parasitic	Toxoplasmosis	19	6.41
	Cryptosporidiosis	6	2.02
	Isosporiasis	5	1.68
	Amoebiasis	2	0.68
	Malariea	2	0.68
	Gardiasis	1	0.34
Fungal	Candidiasis (oral,oesophageal)	43	14.52
	Pneumocystis	21	7.09
	Cryptococcosis	7	2.36
	Dermatosis of hairless skin	1	0.34
Others	Gastroenteritis without specified germs	20	6.75
	Other pneumopathies	14	4.72
	Neoplasia	10	3.38
	Cirrhosis	4	1.35
	Kaposi's disease	3	1.01
	Lymphoma	2	0.68
	Unspecified neurological OI	2	0.68

Therapeutic and outcome aspects

Cotrimoxazole chemoprophylaxis was initiated in 62.16% of patients and 47.3% were not yet receiving antiretroviral treatment. The average length of hospitalization was 13.89 ± 11.14 days [0-83 days]. In our sample, 75% of patients had complications. These were dominated by ionic disorders (dysnatremia, dyskalaemia) in 12.2% of cases, followed by respiratory distress (11.5%) respectively. Among the 296 patients, 116 died, giving a case fatality rate of 39.2%.

DISCUSSION

The main manifestation of a significant drop in immune defence during HIV infection is the appearance of opportunist infections. During our study period, we recorded 296 PLHIV out of a total of 1208 patients hospitalized in the infectious and tropical diseases department of the University Hospital center of Fann, giving a hospital prevalence rate of 24.5%. A previous study conducted at SMIT in 2007 and 2008 found a slightly higher prevalence (27%) **[7]**. In Gabon, Okome-nkoumou**[8]** reported a rate of 27.7%. This slight drop in prevalence in our study may be due to the improvement and decentralisation of care in peripheral healthcare facilities. Nevertheless, the frequency of opportunistic infections remains high, which could be explained by the delay in patient management, as most patients were symptomatic at WHO stage 4 (69.26%), despite the adoption of test and treat through Tatarsen in Senegal. In addition, the SMIT at Fann is the national referral centre for HIV patients with very advanced disease states.As noted by other authors **[9,10]**, a predominance of

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young adults and females was noted in our series. This finding is confirmed by national data showing a «feminisation» of the HIV epidemic in Senegal. The CNLS annual report for 2022 found a sex ratio of 1.45 in favour of women **[5]**.
Among the reasons for hospitalization, the most frequent signs were deterioration in general condition (35.5%), cough (30.1%) and fever (26.7%). These outcomes are superimposed on those of Lawson **[11]**, where general deterioration and fever were found in more than half the cases. **Mbula [12]** noted diarrhea (88.9%), vomiting (87%) and cough (77.8%) as the main reasons for consultation.
During the course of HIV infection, several opportunistic infections (OI) may appear. In terms of bacterial infections, tuberculosis was the most frequently observed OI in our study (38.5% of cases). This figure is similar to that of Fortes **[7]**, where tuberculosis was the main opportunistic infection in PLHIV, with a prevalence of 36%. Kone **[10]** reported a prevalence of 41.8%. In a Chinese cohort, the rate was 35.3%. Tuberculosis is the leading opportunist infection in our countries **[13,14]**. The frequency of this co-infection can be explained by the fact that HIV infection is the factor most conducive to the transition from latent tuberculosis infection to tuberculosis disease **[15]**, and Senegal is also located in a tuberculosis-endemic area. The main tuberculosis site was pulmonary (92.1%), followed by neuromeningeal (29.82%) and lymph node (28.07%). The high prevalence of pulmonary tuberculosis is explained by the fact that it is the only transmissible form of the disease, being responsible for its dissemination. Extra-pulmonary forms of tuberculosis would occur at a late stage of infection, which would explain the frequency of extra-pulmonary forms, which are not negligible in our patients.
Apart from tuberculosis, the most common bacterial infection was common bacterial pneumonia, with 23 cases (7.77%), as was the case in Ivory Coast in Grant's series **[16]**, where bacterial pneumonia was recorded in 15% of patients. On the other hand, the prevalence of bacterial pneumonia was higher in a study conducted in China **[17]**, with a rate of 39.8%. This difference may be explained by a lack of technical facilities in our context, where cytobacteriological examination of sputum is not always available. Lower respiratory infections are one of the main causes of mortality in the world **[18]**.
As for the viral diseases, viral hepatitis B was the most common, accounting for 6.76% of cases. This may be explained by the fact that HIV infection and hepatitis B have similar transmission routes **[19]**. Regarding herpes infections, 5 cases were probably under-diagnosed. We noted 4 cases of Covid-19, i.e. 1.35%, because the study period coincided with the COVID19 pandemic during that period.
Concerning parasitic infections, toxoplasmosis was the most common infection, with a rate of 6.41%. In fact, cerebral toxoplasmosis is the most common opportunist infection of the central nervous system in PLHIV at the AIDS stage **[20]**. On the other hand, a higher prevalence than ours (11.2%) has been reported in Togo **[9]** and **Kra [14]** inIvory Coast (17.4%). This difference could be explained by the fact that more than half of our patients (62.16%) had received cotrimoxazole chemoprophylaxis. Cryptosporidiosis was reported in 2.02% of patients in our series, higher than that reported by Dovonou**[21]** who noted a frequency of 0.10% in his study.
As for fungal infections, candidiasis was the most common mycosis (14.52%) in our series. One study showed that 4% of men developed oral candidiasis within one year of HIV seroconversion, 18% within 4 years and 26% within 5 years **[22]** . In Bongenya's study **[23]**, the frequence was 16%, and Kone **[10]** found oral and oesophageal candidiasis in 31.4% of his cohort. It is the main opportunistic digestive infection in HIV infection.
Pneumocystis accounted for 7.09%; **Tassin [24]** has shown a 30% increase in pneumocystis in Reunion between 2015 and 2022, particularly among PLHIV. It remains one of the most common opportunistic infections in industrialized countries **[25]**. With the advent of advanced strategies, cryptococcosis is becoming less frequent, and was present in 2.36% of cases. A reduction in the prevalence of neuro-meningeal cryptococcosis in HIV-infected patients was noted from 2010 to 2016 (3.66% to 0.83%) in the **ChadII** study in Morocco**[26]**. There was an association of several opportunistic diseases in the same patient. This can be explained by the severe immunosuppression found in our patients and the possible association of several opportunist infections at the same time.
Kaposi's disease accounted for 1.01% of cases. The use of antiretroviral (ARV) therapies has helped to reduce the incidence of Kaposi's disease in PLHIV, by strengthening the immune system and controlling viral replication.
Overall case lethality was 39.2%. However, this was slightly lower than the 44% found in a previous study conducted in the same department **[7]**. Several factors could explain this high mortality among PLHIV: late arrival in the care setting, unavailability of certain molecules for the management of these opportunist infections , late initiation of ARV due to delayed management, therapeutic failure due to poor compliance, self-medication, visits to «traditional practitioners» in our context, and difficulties associated with the management of complications that have already set in. Early diagnosis and management of these opportunist infections are decisive factors in the prognosis of HIV infection

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4. CONCLUSION

Opportunistic infections occur at a late stage, favoured by delays in treatment. Young adults are the most affected, and the mortality rate remains high. We need to ensure early detection of HIV infection ensure early care for PLHIV by implementing antiretroviral treatment, strengthening the technical platform and ensuring the availability and accessibility of certain molecules for the treatment of these opportunistic infections will make it possible to considerably reduce mortality.

CONSENT

Confidentiality was ensured by the identification numbers used to ensure anonymity. Patients' names did not appear on the survey form. these patients will not be identified in scientific publications and/or in various presentations related to this study.

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

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REFERENCES

1. Cachay R edward

Infection par le virus de l'immunodéficience humaine (VIH)www.msdmanuals.com/fr/accueil/infections/infection-par-le-virus-de-l'immunodéficience-humaine-vih/infection-par-le-virus-de-l'immunodéficience-humaine-vi

2. Key facts about HIV/AIDS [cited 20 Aug 2023]. Available at: https://www.who.int/fr/news-room/fact-sheets/detail/hiv-aids

3. AIDS in Africa: a time for hope. Le Monde.fr [Internet]. 7 Jul 2022 [cited 22 Oct 2023]; Available at: https://www.lemonde.fr/afrique/article/2022/07/07/sida-en-afrique-le-temps-de-l-espoir_6133771_3212.html

4. cnls-rapport-annuel-2020.pdf [Internet]. [cited 20 August 2023]. Available at: https://www.cnls-senegal.org/wp-content/uploads/2001/01/cnls-rapport-annuel-2020.pdf

5. Rapport-Annuel-CNLS-2022.pdf [Internet]. [cited 22 Oct 2023]. Available at: https://www.cnls-senegal.org/wp-content/uploads/2001/01/Rapport-Annuel-CNLS-2022.pdf

6. TewachewAB, Mekonnen WN, Mekuria ab, Amare YE Determinants of Opportunistic Infections Among HIV-Positive Patients on HAART in Debre Berhan Referral Hospital, North Shoa Zone, Ethiopia, 2020: A Case – Control Study HIV AIDS (Auckl). 2021; 13:337–347. doi: 10.2147/HIV.S298661

7. Fortes Déguénonvo L, Manga NM, Diop SA, Dia Badiane NM, Seydi M, CT. Ndour et al Current profile of HIV-infected patients hospitalized in Dakar (Senegal) Bull. Soc. Pathol. Exot. 2011; 104:366-370 DOI 10.1007/s13149-011-0178-9

8. Okome-Nkoumou M, Mbounja-Loclo ME, Kombila M. Overview of opportunistic infections during HIV infection in Libreville, Gabon. Cahiers d'études et de recherches francophones / Santé. 22 Dec2000;10(5):329-37.

9 Apetse K, Assogba K, Kevi K, Balogou AAK, Pitche P, Grunitzky E.

Opportunistic infections of the HIV/AIDS in adults in hospital settings in Togo Bull SocPatholExot 2011; 104(5):352-4. doi: 10.1007/s13149-011-0139-3.

.

10.Koné S, Koné D, Kouassi L, Yapa S, Touré K, Koné F et al News during the evolution of HIV/AIDS infection in a reference center about 327 cases collected in the internal medicine department of the Bouake teaching hospital, Ivory Coast. RAFMI 2022; 9 (2-2): 30-35

11.Lawson ATD, DiopNyafouna SA, Diousse P, Diop MM, Niang M, DiopBM.People living with AIDS, management in hospitalization in decentralized area in Senegal, example of the town of Thies Rev Mali Infect Microbiol 2017; 10:26-36https://doi.org/10.53597/remim.v0i10.955

12. Mbula MMK, Situakibanza HNT, Mananga LG, Longokolo MM, Mandina NM, Mayasi NN, et al Clinical and biological profile of people living with HIV/AIDS followed in the Infectious Diseases Service of the University Hospital of Kinshasa (Democratic Republic of the Congo) Rev Mali Infect Microbiol 2020;15:21-29 doi 10.53597/remim.v15i2.1727

UNDER PEER REVIEW

13. OUEDRAOGO SM , M. OUEDRAOGO M, DAGNA N S, ADOM AH Side infection suring HIV/AIDS at Trechville university health center (CHU) Mali Médical 2007 T XXII (1) : 26-28

14. Kra O, Aba YT, Yao KH, Ouattara B, Abouo F, Tanon KA, et al. Clinical, biological, therapeutic and evolving profile of patients with HIV infection hospitalized

at Infectious and tropical diseases unit in Abidjan (Ivory Coast). Bull. Soc. Pathol. Exot. (2013) 106:37-42DOI 10.1007/s13149-012-0246-9

15 .Traore M, Keita BS, Samake D, Dembele D, Diarra A, Keita M, et al. CAUSES OF DEATH OF HIV-POSITIVE PATIENTS UNDER ANTIRETROVIRAL TREATMENT, HOSPITALIZED AT SIKASSO HOSPITAL. Malian Review of Science and Technology. May 20, 2019;(21):122-9.

16. Grant AD, Sidibé K, Domoua K, Bonard D, Sylla-Koko F, Dosso M, et al.

Spectrum of disease among HIV-infected adults hospitalized in a respiratory medicine unit in Abidjan, Côte d'Ivoire Int J Tuberc Lung Dis 1998 Nov;2(11):926-34

17. Meng S, Tang Q, Xie Z, Wu N, Qin Y, Chen R et al Spectrum and mortality of opportunistic infections among HIV/AIDS patients in southwestern China Eur J ClinMicrobiol Infect Dis 2023;42(1):113-1 20.doi: 10.1007/s10096-022-04528-y

18. Philippart F. Managing lower respiratory tract infections in immunocompetent patients. Definitions, epidemiology, and diagnostic features. Med Mal Infect. 2006;36(11):784‐802.

10.1016/j.medmal.2006.07.017

19 Kane A, Lioyd J, Zaffran M, Simonsen L, Kane M tRASNSMISSIOM OF hepatitis b , HEPATITIS c , and human immunodeficiency viruses through unsafe injections in the developing word: MODEL-based regional estimates bulletin of the world health organization 1999.77 10 801-807

20. Porter SB, Sande MA. Toxoplasmosis of the central nervous system in the acquired immunodeficiency syndrome. N Engl J Med. 3 Dec 1992;327(23):1643‐8. N Engl J Med doi: 10.1056/NEJM199212033272306

21. Dovonou AC, Alassani A C, Attinsounon CA, Saké K, Adè S, Ahoui S, et al Clinical and Immunological Characteristics of HIV-Infected Patients at the Treatment Initiation at the University Hospital of Parakou (Benin) Open Journal of Immunology, 2017, 7, 5 1-58 DOI: 10.4236/oji.2017.73005

22.Lifson AR, HiltonJF, Westenhouse JL, Canchola AJ, Samuel MC, Katz MH, et al. Time from HIV seroconversion to oral candidiasis or hairy leukoplakia among homosexual and bisexual men enrolled in three prospective cohorts. AIDS. 1994;8(1):73‐9. doi: 10.1097/00002030-199401000-00011

23.Bongenya BI,Bulanda BI, Bukongo RN, ChugaD,Botomuito HT, Kabasele J Y.D. et al Prevalence of Opportunist Infections among the Professionals Sex Workers and Their Customers Living with the HIV under ARV in Kinshasa. Open Access Library Journal, 2022 9:e7927.

https://doi.org/10.4236/oalib.1107927

24.Tassin C, Delpon NL, Miltgen G, Bandjee MJ, Traversier N, Jaubert J, et al. Epidemiological characteristics of P. jirovecii pneumonia in Reunion Island in 2015 and 2022. Medicine and Infectious Diseases Training. 2023;2(2):S126. https://doi.org/10.1016/j.mmifmc.2023.03.294

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25. Maillard A, MabroukiA ,Lemiale V

Pneumocystis pneumonia in critically ill patients

Intensive Care Medicine 2023, 32(4):357-370 DOI: 10.37051/mir-00185

26.Chadli S, Aghrouch M, TaqarortN ,Malmoussi M, Ouagari Z, , Moustaoui F ET alNeuromeningeal cryptococcosis in patients infected with HIV at Agadir regional hospital, (Souss-Massa, Morocco). Journal of MedicalMycology. 2017;27(3):e30.

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