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Original article

Sociodemographic and clinical profile of HIV/AIDS patients in Upper Egypt: A multi-centre study

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ABSTRACT

Background: Despite the global increase in human immunodeficiency virus (HIV) prevalence, there is little knowledge regarding the nature of the HIV clinical profile and patients' sociodemographic characteristics in Upper Egypt. This study aimed to describe the sociodemographic and clinical profile of HIV-infected patients registered in treatment centers in Upper Egypt over the past 7 years. **Methods:** Data were collected from the available medical records for 650 patients at the three main HIV healthcare centers in Upper Egypt from January 2015 until December 2021. The collected sociodemographic variables included age, sex, occupation, educational level, residence, and risk factors. In addition, clinical examination data, treatment regimens, laboratory investigations, and outcome data were obtained. **Results*:*** The study found that most patients (85.5%) were male, with ages ranging from 3 to 78 years and a median age of 33. Intravenous drug use (44.5%) was the most common transmission route, and fever (84.3%) was the most frequently reported symptom. Pneumonia (24.3%) was the most registered opportunistic infection. Median CD4 cell counts were 299 cells/mm^3 before treatment and 366 cells/mm^3 after treatment. PCR values were available for 631 patients (97%), with viremia evident in 630 patients (99.8%) before treatment. 73.2% of patients showed improvement in outcomes, while 8.3% died. **Conclusion*:*** The current study findings provide relevant information for the National AIDS Program (NAP) to design HIV education messages and apply preventive measures accordingly.

Introduction

Human immunodeficiency virus (HIV) represents a significant global public health challenge [1]. As per the 2022 report from the Joint United Nations Program on HIV/AIDS (UNAIDS), around 39 million individuals worldwide are living with HIV [2]. Notably, HIV transmission continues to occur in the Middle East and North Africa (MENA) region [3]. Since its identification, HIV has resulted in the deaths of over 40 million individuals

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up until 2023. In Egypt, while less than 0.02% of the total population is living with HIV, there is a notable increase in new infections among key populations with high exposure risks, such as drug users, sex workers, and men who have sex with men [4].

Despite the increasing global prevalence of HIV, there is a lack of comprehensive understanding regarding the HIV clinical profile and sociodemographic characteristics of patients in Upper Egypt. Past research suggests that people living with HIV (PLWHIV) in Egypt encounter stigmatization, impacting the quality of care they receive [5,6]. The objective of this study is to offer an overview of the sociodemographic profile and clinical characteristics of all HIV-diagnosed patients in Upper Egypt from 2015 to the end of 2021.

Methods

Study design and setting

The timeframe for conducting this retrospective observational study was from April 2021 until January 2023. Information was extracted from the medical records of all individuals living with HIV (confirmed via Western blot analysis) at the main HIV healthcare centers in Upper Egypt (Minia, Assiut, and Aswan) from January 2015 to December 2021. Upper Egypt encompasses a vast area of the Nile Valley, spanning multiple governorates from Beni Suef in the north to Aswan in the south [7]. This region is home to approximately 36 million people, constituting roughly 40% of the total population [8]. The cultural landscape of Upper Egypt is diverse, characterized by a blend of multiple cultures and traditions that have evolved over time, creating a distinct and unique identity.

A comprehensive National AIDS Program has been established to manage the disease in Egypt effectively. This program consists of the National AIDS Program Center and numerous distributed HIV healthcare centers. It encompasses voluntary testing and counseling services as well as the provision of antiretroviral therapy. Despite these efforts, Egypt faces challenges in maintaining a low prevalence of HIV/AIDS.

Patients were either referred from various medical centers following confirmed infection or diagnosed for the first time at these centers. All confirmed positive cases were registered and reported to governmental health authorities and, ultimately, to the National AIDS Programme (NAP) center. Eligible participants included individuals at any stage of HIV infection. The study adhered to the Reporting of Studies Conducted Using Observational Routinely Collected Health Data (RECORD) guidelines [9].

Data collection

The study collected the following sociodemographic variables: age, sex, occupation, educational level, residence, and risk factors. Detailed clinical examinations, treatment regimens focusing on treatment compliance, laboratory investigations, and outcome data were obtained from the registry. An expert supervisor monitored the extraction procedures to maintain data quality. The researchers and the supervisor regularly reviewed the checklists for consistency and completeness during the data extraction process.

Definitions

Optimal antiretroviral treatment (ART) adherence is defined as taking at least 95% of the prescribed antiretroviral (ARV) drugs within a specified period. Adherence was considered good if it was at least 95% (missing fewer than 2 doses out of 30 or fewer than 3 doses out of 60), as documented by the ART healthcare provider. Adherence was deemed poor if it falls between 85% and 94% (missing 3 to 5 doses out of 30 or 3 to 9 doses out of 60), as documented by the ART healthcare provider [10].

Statistical analysis

The re-coded data was entered into the computer using "Microsoft Office Excel Software 365." Subsequently, the data were transferred to the Statistical Package for Social Science Software (IBM SPSS), version 24, for statistical analysis. Categorical data were presented as frequencies and percentages, while quantitative variables were summarized using the median and interquartile range.

Ethical approval

Permission to conduct this study was obtained from the National AIDS Program within the Ministry of Health and Population (MOHP). Ethical approval for the study protocol (No. 571/10/21) was granted by the Ethical Review Board at the Faculty of Medicine, Aswan University. All data collection procedures adhered to the principles of the Helsinki Declaration of Biomedical Ethics [11]. Analyses were conducted using deidentified and anonymized data.

The research ethics committee waived the requirement for informed consent since the study is retrospective and uses anonymized medical records.

Results

The medical records of 650 HIV-positive patients referred to the HIV treatment centers from January 2015 to December 2021 were reviewed. **Table 1** presents the analysis of sociodemographic characteristics. The majority (85.5%) were male. Patients' ages ranged from 3 to 78 years, with a median age of 33 (IQR = 28–41 years). Around half of the patients (48.3%) resided in Minia governorate. The most common education level attained was intermediate education (48.5%), with approximately a quarter being illiterate (22.3%). Approximately one-third were unemployed, while 33.4% were skilled workers.

Regarding the primary risk factors associated with HIV infection acquisition as reported by HIV patients, the most prevalent risk behavior was intravenous drug use (n=289, 44.5%), followed by sexual transmission (n=281, 43.2%). The least reported risk behavior was blood transfusion (n=7, 1.1%), as depicted in **figure (1)**.

Most patients did not have comorbidities. The most prevalent comorbidity was type 1 diabetes mellitus (50.7%), followed by hypertension (37.7%) , as shown in **table (2)**. Chronic liver disease was the least prevalent comorbidity. Approximately 11.2% of HIV patients presented with hepatitis B virus (HBV) coinfection. Additionally, 135 HIV patients (20.7%) had coinfection with hepatitis C virus (HCV), while 27 HIV patients (4.1%) were coinfected with both HBV and HCV.

More than three-quarters (n=502, 77.2%) of the cases were accidentally discovered. On the other hand, 148 patients (22.8%) presented with various clinical symptoms **(Table 3)**. The most frequently reported complaints of people living with HIV symptoms were fever (84.3%) and diarrhea (69.4%). In a few cases, there was myalgia or arthralgia (2.2%) and pharyngitis (1.5%).

Clinical signs of significance were observed in only 144 patients. The most common sign was muscle wasting, present in 111 patients (77.1%), followed by generalized lymphadenopathy in 65 patients (45.1%). The most registered opportunistic infection was pneumonia (24.3%), followed by cutaneous infections (11.8%) and oral candidiasis. Kaposi's sarcoma was diagnosed in twenty-four patients (16.7%), as depicted in **table (4)**.

Patients were receiving various treatment regimens, with first-line therapy being the most common among registered HIV patients (93.2%). Dolutegravir plus emtricitabine/tenofovir disoproxil was the most frequently used treatment regimen by 75.0% of HIV patients, followed by emtricitabine/tenofovir disoproxil + efavirenz (15.8%). There was no information regarding the treatment regimens for 67 patients (data not shown in the medical records), as indicated in **table (5)**.

We observed that the majority of HIV patients were adherent to their prescribed treatment regimen (N=532, 82%). **Table 6** summarizes the laboratory findings at baseline, before treatment, and after treatment. CD4 cell count data were accessible for 410 patients (63.4%). The median count was 299 cells/mm^3 (range: 8–910; IQR: 172–405) before treatment and 366 cells/mm^3 (range: 84–979; IQR: 259–589.1) post-treatment initiation. PCR values were available for 631 patients (97%). Viremia was evident in 630 patients (99.8%) before treatment. Six months later, following treatment initiation, positive PCR values were detected in 32 patients (6.4%), while negative values were observed in 401 patients (92.6%). Unfortunately, 198 patients were lost to follow-up.

IQR: Interquartile range, CBC: Complete blood count, WBC: White blood cells, ALT: Alanine transaminase, AST: Aspartate transaminase, INR: International normalized ratio, PCR: Polymerase chain reaction.

Out of the total 650 people living with HIV, approximately three-quarters (73.2%) (N = 476) showed improvement, 14.3% (N = 93) experienced deterioration with detectable viremia, and 8.3% (N = 54) passed away due to AIDS-related disorders.

Table 1. Sociodemographic characteristics of the registered HIV patients (2015 - 2021) in Upper Egypt (N=650).

Baseline characteristics		**N**	**%**
Gender	Male	556	85.5
	Female	94	14.5
Age	Median (Interquartile range) years	33 (IQR 28-41)	
	Range	3-78 years	
Governorate	Minia	314	48.3
	Assiut	173	26.6
	Aswan	163	25.1
Education	Illiterate	145	22.3
	Basic education	94	14.5
	Intermediate education	315	48.5
	High education	96	14.7
Occupation	Unemployed	213	32.8
	Skilled workers	217	33.4
	Housewife/Students/Children	102	15.7
	Professionals	37	6.0
	Governmental employees	41	5.7
	Retired	6	0.9
	Others[#]	34	5.2
Working group (N=437)	Risky occupations[*]	15	3.4
	Non-risky occupations	422	96.6

[#] Merchant, Painter; [*] Health care workers.

Table 2. Comorbidities and hepatitis coinfection among registered HIV patients (2015 - 2021) in Upper Egypt.

Comorbidities[#] (N=69)		**N**	**%**
Type 1 Diabetes Mellitus	Yes	35	50.7
Hypertension	Yes	26	37.7
Cerebrovascular Disease	Yes	18	26.1
Chronic Kidney Disease	Yes	10	14.5
Cardiovascular Disease	Yes	9	13.0
Chronic Liver Disease	Yes	4	5.8
Hepatitis coinfection			
Hepatitis B virus	Positive	73	11.2
	Negative	577	88.8
Hepatitis C virus	Positive	135	20.8
	Negative	515	79.2

[#] Reported more than one comorbidity

Table 3. Clinical presentation of the registered HIV patients (2015 - 2021) from Upper Egypt (N=148).

Clinical presentation[#]	N	%
Fever	113	84.3
Diarrhea	93	69.4
Nausea and vomiting	34	25.4
Rash	15	11.2
Headache	9	6.7
Myalgia or arthralgia	3	2.2
Pharyngitis	2	1.5

[#] Reported more than one symptom.

Table 4. Clinical signs and opportunistic infections of registered HIV patients (2015 - 2021) from some upper Egypt governorates (N=144)[#].

Clinical signs and opportunistic infections	N	%
Wasting	111	77.1
Generalized lymphadenopathy	65	45.1
Chest symptoms for pneumonia	35	24.3
Kaposi sarcoma	24	16.7
Cutaneous infection	17	11.8
Oral candidiasis	14	9.7

[#] Reported more than one sign.

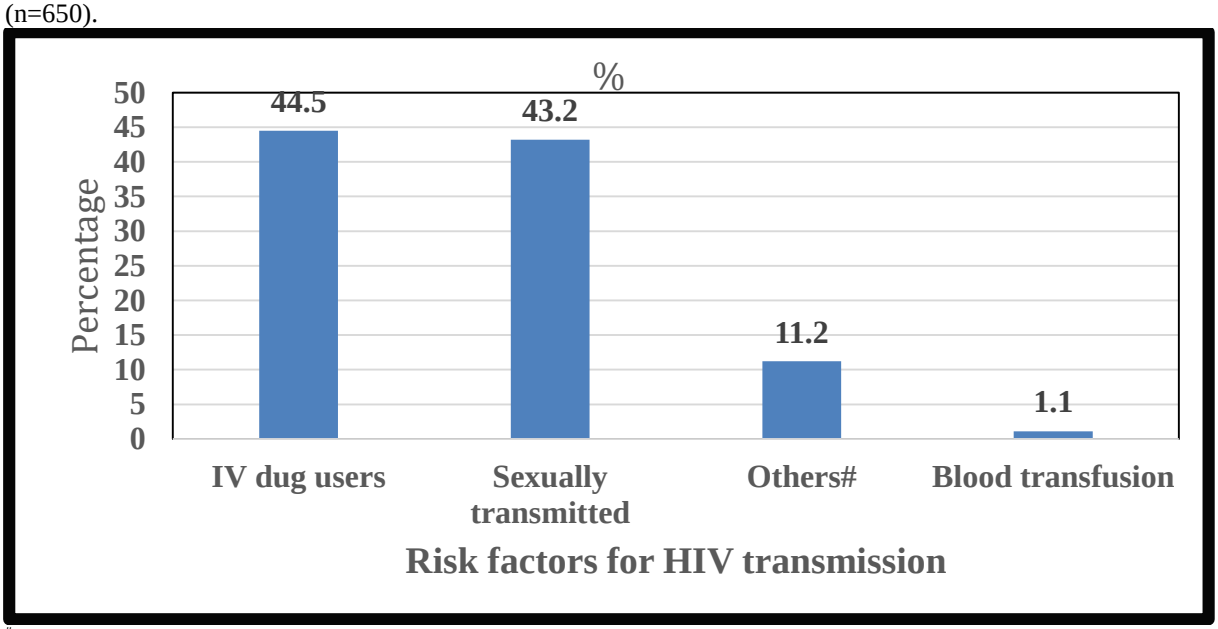
Table 5. Percent distribution of the registered HIV patients (2015 - 2021) in Upper Egypt by treatment regimen (N=583).

Treatment Regimen	**N**	**%**
First line therapy *(n=543, 93.1%)*		
Dolutegravir + Emtricitabine/Tenofovir disoproxil	437	75.0
Emtricitabine/Tenofovir disoproxil + Efavirenz	92	15.8
Dolutegravir + Abacavir + Lamivudine	11	1.9
Lamivudine + Nevirapine + Zidovudine	3	0.5
Second line therapy (1) *(n=6,1%)*		
Lopinavir/Ritonavir + Emtricitabine/Tenofovir disoproxil	4	0.7
Darunavir/Cobicistat / Emtricitabine / Tenofovir alfenamide	2	0.3
Other lines of treatment *(n=34, 5.8%)*		
Lamivudine + Efavirenz	30	5.2
Dolutegravir + Lamivudine	2	0.3
Lopinavir/Ritonavir + Lamivudine	2	0.3

Table 6. Laboratory and vitro-immunological profile of the registered HIV patients (2015 - 2021) in Upper Egypt.

Laboratory data		**Pretreatment Median (IQR)**	**(Last registered) On treatment Median (IQR)**
CBC findings (N=531)	*Hemoglobin (g/dL)*	11.9 (10.0-13.0)	10 (8-12.1)
	WBC (Thousands/mm^3)	10.30 (6.90-12.80)	10.30 (6.90- 12.80)
	Platelets (Thousands/mm^3)	251 (189-330)	251 (189-330)
Liver function tests (N=410)	*ALT (U/L)*	25(18-38)	25 (18- 39)
	AST (U/L)	25(18-40)	25 (18- 40)
	Total bilirubin (mg/dL)	0.9 (0.8-1.1)	0.9 (0.8-1.1)
	Direct Bilirubin(mg/dL)	0.3(0.2-0.6)	0.3 (0.2- 0.6)
	Albumin (g/dL)	3.4(3-4.2)	3.4 (3-4.2)
	INR	1(1-1)	1 (1-1)
Kidney function tests (N=410)	*Blood Urea (mg/dL)*	31 (24-39)	25 (17.5- 32)
	Serum Creatinine (mg/dL)	1 (0.8-1.3)	0.9 (0.75-1.1)
CD 4 count (N=410)	*CD4 cell count (cells/mm3)*	299 (172-405)	366 (259-589.1)
Viremia level (N=631)	*PCR*	-Detected in 630 patients (99.8%) -Not detected in 1 patient (0.2%)	-Detected in 32 patients (7.4%) -Not detected in 401 patients (92.6%)

Figure 1. Percent distribution of registered HIV patients (2015 - 2021) concerning risk factors in Upper Egypt (n=650).



#Others, such as vertical transmission.

Discussion

In this retrospective observational study, we examined the medical records of 650 HIV-positive patients in Upper Egypt who presented to HIV healthcare centers from January 2015 to December 2021. Our findings indicate that most were males, predominantly in the young to middle age range. Numerous studies have demonstrated that HIV infection predominantly affects young individuals. This could be due to their heightened risk of HIV exposure, stemming from increased sexual activity and travel. However, studies have noted HIV infections occurring across age extremes. Numerous studies worldwide have examined the sociodemographic profile and clinical characteristics of HIV-infected patients, with

varying results based on geographical distribution [12,13]. In a study by **Siddiqui et al.** conducted among HIV patients admitted to a tertiary care hospital in Karachi, Pakistan, the majority were males. The most common symptoms reported were weight loss, fever, and diarrhea, with a history of blood transfusions identified as the most significant risk factor [13]. In another study conducted in Canada, the diagnosis rate among males was higher than that among females. Sexual transmission, particularly among men who have sex with men, was the most frequently reported risk factor [14].

In accordance with our study, **Khamis et al.** conducted a retrospective analysis of the medical records of 326 HIV-infected patients from 1989 to 2016. They reported that the overall mean age of the cohort was 36.0±15.0 years, and the majority were males [15]. However, it has been reported in a few studies that HIV infection is more common in females [16,17]. We believe that this significant male predominance in our study is not due to an increased prevalence of HIV in males but to our sociocultural circumstances. Social stigma is more distressing to females than males regarding seeking HIV testing and treatment. Moreover, males are more likely to be screened, for example, when applying for military service or traveling abroad.

The prevalence of HIV infection varies significantly across countries and even within different regions of the same country. Our study revealed that approximately half of the patients (48.3%) resided in Minia governorate, followed by Assiut and Aswan. These variations may be attributed to differences in environmental factors, sociocultural contexts, lifestyle choices, customs, and traditions among the governorates. Additionally, HIV stigma plays a significant role in seeking medical advice and data registry, leading to a decrease in the reported number of cases.

In our study, the most common level of education attained was intermediate, while approximately one-quarter were illiterate. Similarly, a study in Tehran reported that the most common education levels were low and intermediate (72.7%), with 7.8% being illiterate [18]. Low levels of education or illiteracy may correlate with the risks associated with drug addiction or abnormal sexual behaviors, which are primary modes of HIV transmission in our study. Another factor could be health illiteracy within this category regarding HIV preventive measures.

We observed that approximately one-third of HIV patients were unemployed, while more than one-third were skilled workers. Similarly, **Rabkin et al.** reported that 65% of HIV cases were unemployed [19]. This could be attributed to the social repercussions of the disease or the unique circumstances of unemployed patients, such as drug addiction.

The modes of HIV transmission significantly vary according to geographical distribution. Our study found that the primary risk factors for acquiring HIV infection, as reported by HIV patients, were intravenous drug use, followed by sexual transmission, with blood transfusion being the least reported risk behavior. These findings align with the study by **Kazemifar and Bijani**, which identified intravenous drug abuse as the most predominant risk factor, followed by sexual transmission [19]. However, **Ahmetagic et al.** noted that in Germany, the primary mode of transmission is through homosexual contact, followed by intravenous drug use [20].

In Upper Egypt, the prevalence rate of intravenous drug abuse is significantly underestimated, as it was identified as the main risk factor for HIV transmission in our study. Conversely, the low rate of blood transfusion as a risk factor for HIV/AIDS transmission could be attributed to HIV screening before blood transfusion procedures.

Regarding comorbidities, our findings indicated that the majority of registered HIV patients had no comorbidities. We observed that 11.2% of HIV patients had HBV coinfection, while 20.7% had HCV coinfection, and 4.1% were coinfected with both HBV and HCV. Given their shared transmission route, HIV-infected individuals face a heightened risk of acquiring HBV and HCV. However, the elevated prevalence of HCV in our study is likely linked to injection drug use (IDU), a major factor in HCV transmission [21].

Contrary to our findings, **Dias et al.** reported that among twenty-four HIV patients, nine had HCV, while only three were coinfected with HBV [22].

Opportunistic diseases exhibit variations based on geographic distribution and race [23]. In our study, pneumonia emerged as the most common opportunistic infection, followed by cutaneous infections and oral candidiasis. Additionally, twenty-four patients (16.7%) were diagnosed with

Kaposi's sarcoma. The most frequent clinical sign observed was muscle wasting, followed by generalized lymphadenopathy.

In contrast, **Ahmetagic et al.** reported that among 28 HIV-infected individuals, 39 cases of opportunistic diseases developed in 12 patients. In terms of the frequency of opportunistic diseases, tuberculosis was the most prevalent, followed by *Pneumocystis carinii* pneumonia [20].

Our study revealed that more than three-quarters of the cases were incidentally discovered. This can be attributed to policies promoting increased HIV testing among the general population, including mandatory testing such as for military service, travel abroad, and screening blood donations, as well as voluntary testing services. These efforts contribute to the early detection of HIV in asymptomatic stages. Additionally, increased awareness of the disease and its consequences through various channels such as medical services, media platforms, and counseling services provided by trained personnel play a significant role in this increased detection rate.

Additionally, we observed that the most frequently reported symptoms were fever and diarrhea, with a few cases presenting myalgia or arthralgia and pharyngitis. In contrast, another study in Nigeria reported that the most common clinical features among 200 HIV patients were weight loss followed by fever [24].

Regarding treatment, we found that dolutegravir plus emtricitabine/tenofovir disoproxil was the most used regimen, followed by emtricitabine/tenofovir disoproxil plus efavirenz. Variations in adherence to ART regimens have been documented in numerous studies [25,26]. In a study conducted in Turkey, 61% of PLWHIV demonstrated high adherence to ART, while 37.9% exhibited moderate adherence [27]. However, data on ART compliance from Egypt are limited. Risk factors associated with low treatment compliance include adverse effects of ART, economic burdens such as lack of insurance [28], and stigmatization [29].

Our study revealed that the majority of HIV patients were compliant with the prescribed HIV treatment regimen. This high level of compliance can be attributed to several factors, including the availability of antiretroviral drugs facilitated by national AIDS program efforts, their efficacy in increasing CD4 counts, and their low rate of resistance. Consequently, physicians can choose dolutegravir-based regimens as the first-line treatment option, leading to high patient treatment compliance.

Monitoring of people living with HIV encompasses clinical evaluation for opportunistic infections, virological assessment through viral load measurement, and immunological assessment by counting CD4 cells. In our study, we observed that the majority of patients had a CD4 cell count below 200 cells/mm^3, indicating significant immunodeficiency, typically at an advanced stage of HIV infection [25]. In the current study, data on CD4 cell count were available for 410 patients (63.4%) only. The absence of CD4 count data for more than one-third of patients might be due to the "treat all" approach, which reduces barriers to initiating treatment regardless of CD4 cell count. Among the available data, the median count was 299 cells per mm^3 (range 8–910; IQR: 172–405) before treatment. This suggests early detection of patients in our study. After treatment initiation, the median count increased to 366 cells per mm^3 (range: 84–979; IQR: 259–589.1). Early initiation of antiretroviral drugs may help maintain a CD4 cell count above 500 cells per mm^3 [30].

An evaluation conducted by **Ozdemir et al.** of 138 patients' CD4 cell count at presentation showed a median of 214 cells/mm^3, which increased to 265 cells/mm^3 after admission [26].

Regarding PCR values, data were available for 631 patients (97%). Viremia was evident in almost all of them (99.8%) before treatment. After the start of treatment, positive PCR values were detected in 32 patients (7.4%). In contrast, a study by **Mzingwane et al.** reported that at least one viral load result after 6 months or more of treatment was available for 65 out of 78 individuals followed for up to 33 months. Among these, 20 patients (30.8%) had detectable viremia, and eight patients (12.3%) experienced virological failure (defined as viral load > 1000 copies/ml) after at least 6 months of highly active antiretroviral therapy (HAART) [27].

Our results indicated that out of 650 HIV-infected patients, approximately 476 patients (73.2%) showed improvement, while 93 patients (14.3%) were lost to follow-up, and 54 patients (8.3%) passed away. These results align with findings from studies conducted by **Khamis et al.** among 326 people living with HIV [15] and those

reported by **Dias et al.** among 539 HIV patients [22].

The high percentage of follow-up loss among patients in our study could be attributed to several factors. One potential reason is the centralization of HIV centers in the capital cities of governorates, making them less accessible to rural populations. Additionally, the younger age group, which is the most common age group affected by HIV, may experience fear of discrimination and stigma, leading to reluctance to seek continuous care and follow-up.

The Egyptian national HIV program is designed to provide comprehensive care, support, and treatment for people living with HIV/AIDS. It operates with clear objectives, strategies, indicators, and collaborating partners, strengthening the national surveillance system and facilitating monitoring and evaluation. Each potential HIV/AIDS project aligns with the national strategic plan to promote collaboration among partners, minimize duplication of efforts, and ensure optimal resource utilization. This approach has fostered a coordinated effort among all active stakeholders.

Legally, all HIV/AIDS cases must be reported to the NAP and can only be treated at designated governmental centers. Strict patient follow-up, including counseling, clinical assessments, laboratory tests, treatment prescriptions, and adherence monitoring, is essential to minimize patient drop-off and enhance overall outcomes.

Limitations of the study

The current study has some limitations that should be taken into consideration. Firstly, the reliance on medical records not specifically designed for research data collection led to instances of missing or inaccurate information. Secondly, while the study included a significant number of patients, its findings may not fully represent the entire country's HIV/AIDS landscape. Lastly, the recording of PCR values for patients on treatment was limited to detectable or non-detectable without specifying quantitative viral load levels.

Furthermore, HIV is heavily stigmatized, particularly in rural areas and among women, resulting in underreporting of cases due to social stigma. However, this study seeks to characterize the sociodemographic and clinical profiles of HIV-infected patients in Upper Egypt. This effort aims to provide a more precise understanding of HIV infection within specific governorates in Upper Egypt. Ultimately, the goal is to offer targeted support for healthcare services, assess the effectiveness of prevention programs, and evaluate control measures in the region.

Conclusion

This study characterizes the sociodemographic and clinical profiles of HIV-infected patients in Upper Egypt. Our findings indicate a male predominance among middle-aged individuals. The primary risk factors identified were intravenous drug use, followed by sexual transmission, with blood transfusion being the least common. These insights are valuable for the NAP to design HIV education messages and implement targeted preventive measures effectively.

Competing interests: None to be declared.

Authors' contributions: M.T. conceived the study, and A.S. and E.F. contributed to managing the literature searches and data. M.S. contributed to data analysis and results writing. M.A., M.S., H.A., and M.H. contributed to data collection and writing. All authors shared in data collection, drafting, and approving the final manuscript in the study, contributed to the article, and approved the submitted version.

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Data availability: The data supporting this study's findings are available from the National AIDs Program in Egypt, but restrictions apply to the availability of these data, which were used under license for the current study and so are not publicly available. Data are, however, available from the author representing the National AIDs program and will be submitted via the corresponding author upon reasonable request and with permission of the National AIDs program.

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