Prevalence of opportunistic infections among people living with HIV in Osogbo, Osun State

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Abstract
This study aims to identify common opportunistic infections and their prevalence among people living with HIV in Osogbo, Osun state, who are receiving treatments for the HIV virus, which has spread widely. A mixed study design was employed, including a hospital-based retrospective study and a Key Informant Interview. The retrospective study involved 280 HIV patients at State Specialists Hospital Asubiaro SSHA Osogbo, Nigeria, and collected socio-demographic, opportunistic infection diagnosis, and viral load test results. The study also included a Key Informant Interview with six health workers in the HIV care unit. Quantitative data was analyzed using descriptive statistics and Chi-square tests, while qualitative data was analyzed using a thematic approach. The study reveals that the majority of People Living with HIV are females (77.1%), with 69% unemployed and 28.6% employed. Most are married (82.5%). In 2020, 58.2% achieved viral suppression, while in 2021, 65.7% and 69% achieved it. Common opportunistic infections include tuberculosis, pruritus, oral candidiasis, and herpes zoster. The prevalence of opportunistic infections decreased from 9.0% to 7.6% between January 2020 and May 2022. The prevalence of opportunistic infections in the study was low, which is due to the high preventive measures employed by the health workers in the hospital. Hence adherence to HAART (Highly Active Antiretroviral Therapy) medications helps to maintain healthy living for People living with HIV.
Keywords: HIV, Opportunistic Infections, Prevalence, Viral load**.**

INTRODUCTION

HIV (Human Immunodeficiency Virus) weakens immunity by destroying the body's CD4+ cells, which are white blood cells. The weakened immunity creates a gateway for other infections in the body. These infections are otherwise referred to as opportunistic infections. Center for Disease Control (CDC) refers to opportunistic infections as illnesses that occur more frequently and are more severe in people with HIV because they have damaged immune systems [1]. According to research, about 90% of sicknesses and deaths associated with HIV are caused by the presence of opportunistic infections [2]. Among children living with HIV, opportunistic infections contribute to 94.1% of HIV-related deaths. [3]

WHO declares that all HIV-infected people are susceptible to developing a wide range of Opportunistic Infections (OIs), however, the worldwide distribution of opportunistic infections highly varies [4] and the variation is largely due to location [5]. People from underdeveloped countries are more likely to develop opportunistic infections due to the low standard of living which could lead to low anti-retroviral drug adherence. Poor adherence to antiretroviral drugs is a major cause of acquiring various kinds of opportunistic infections [5]. For instance, Cote d'Ivoire has a tuberculosis prevalence of 54% among people living with HIV, while the USA has a tuberculosis prevalence of 3% among people living with HIV [5]. In the same research conducted by UNAIDS, USA had a *Pneumocystis carini* pneumonia prevalence of 64% which is only about 4% in Cote d'Ivoire.

Tuberculosis, one of the opportunistic infections has the highest prevalence in most regions. Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) co-infection is a major public health problem among

people living with HIV, especially in sub-Saharan Africa [6]. Its prevalence is a threat for the general public especially for those with illnesses accompanied with suppressed immunity other than HIV [6]. Of the estimated 8.7 million people who developed TB globally in 2012, 1.1 million (13%) were estimated to be HIV-coinfected [7]. According to the World Health Organization [8] about one-third of people living with HIV in the world are co-infected with TB and approximately 750,000 people living with HIV develop TB yearly, mostly in Sub-Saharan Africa.

Since the beginning of the HIV pandemic in 1981, opportunistic infections had been the major cause of morbidity and mortality among people living with HIV/AIDS, which has led to the death of about 94.1% of children living with HIV/AIDs [3]. Despite the significant decline in the incidence of opportunistic infections after the introduction of antiretroviral drugs, they remain a major cause of morbidity and mortality among this vulnerable population. According to the Joint United Nations Programme on HIV/AIDS, one million people died of OIs out of the 36.7 million living with HIV globally [9].

A study of HIV-positive individuals in Nigeria revealed a prevalence of opportunistic infections of 46.6% [10]. Another investigation conducted in Nigeria found that candidiasis has the highest prevalence (8.6 percent) of all opportunistic illnesses at 22.4 percent [11]. Opportunistic infections that are not treated or that are diagnosed too late have a negative impact on the treatment outcomes for HIV-positive individuals, worsening their quality of life, hastening the progression of their disease, raising their medical expenses, amplifying their risk of treatment failure, and reducing their ability to respond to ART medications [12]. It is against these that this study sought to identify the common opportunistic infections among people living with HIV receiving treatments in State Specialists Hospital, Asubiaro, and evaluate the prevalence in the study area, in order to be able to create the necessary awareness to minimize the occurrences.

METHODS

This study was a hospital-based retrospective descriptive study of patients' file over 2 years, 2020-2022, alongside a Key Informant Interview (KII). Patients' files were viewed from January 2020 to May 2022 (2 years 5 months).

The scope of this study was limited to identifying the opportunistic infections, their prevalence and the perception of the health workers towards the opportunistic infections among people living with HIV in State Specialists Hospital, Asubiaro (SSHA), Osogbo, Osun State.

Complete files of HIV-infected individuals that were seen at SSHA between January 2020 and May 2022.

Files of persons with no confirmatory HIV-positive result and those with missing pages were excluded from the research.

Sampling Size

The sample size was estimated using the Fischer's formula.

$$n = \frac{Z^2pq}{d^2}$$

p = proportion in relation to the study objective set at 21% (0.21) (Francis *et al.*, 20016)

A 10% error was added.

A total of 280 case files were reviewed.

Data Collections

Both quantitative and qualitative methods were used in collecting the data.

Quantitative Data Collection Tool: A semi-structured data collection form (questionnaire) was used. Files of patients seen between January 2020 and May 2022 when the research took place were retrieved through a systematic random sampling. The data collected included the socio-demographic details of the patients, the opportunistic infections they were diagnosed of, and their viral load test results. The data extracted from the files were entered into a pre-designed data collection form. (Appendix 1)

Qualitative Data Collection Tool: Key Informant Interviews (KII) (Appendix II) were conducted among healthcare providers to get more information as regards the occurrence of opportunistic infections among the patients. The interviews were directed towards the doctors, nurses, and case managers, all of whom had a first-hand information or knowledge as regards the opportunistic infections among their patients.

Instrument Reliability

Reliability is the accuracy or precision of a research-measuring instrument. Both the questionnaire and KII were reviewed for quality and consistency. The KII sessions were audio recorded to ensure no information was lost during the interview.

Data Analysis

The data collected was transferred and then analyzed using SPSS version 21.0. The level of significance was set at 0.05 and p-values less than or equal to 0.05 were considered statistically significant. The prevalence of HIV-Related Opportunistic Infections was described in percentage. The KII was analysed through a thematic approach.

The data collection form was piloted before use by randomly sampling 50 patients' files of HIV-infected people seen at SSHA. The tool was adjusted and reformatted to facilitate effective and efficient data collection.

Limitations encountered included inability or difficulty in reading the doctor's writings in the case files. There was difficulty in getting access to some hospitals which is why only one hospital was used for this study.

RESULTS

Sociodemographic Characteristics

Based on this research, more than half (51.1%) of the patients were between the ages 41-60 years, 32.5% were youths between 21-40 years, 14.6% were between 61-80 years, 1.4% were children between 1-20 years and 0.4% were aged between 81-100 years. Also, 77.1% of the patients receiving HIV treatments were females while 22.9% were males. Furthermore, 12.1% of the infected individuals had no form of education, 25% had primary education, 49.7% had secondary education and only 13.2% had tertiary education. The majority of the patients were employed (69%), 28.6% were unemployed and 1.8% were still students. Based on their marital status, 9.6% had never been married (single), 82.5% were currently married, 3.2% were separated and 4.7% were widowed. (Table 1)

Table 1: Distribution of Respondent by Socio-demographic Variables

Demographic Characteristics	Category	Frequency	Percentage %
Age group	1-20 years	4	1.4
	21-40 years	91	32.5
	41-60 years	143	51.1
	61-80 years	41	14.6
	81-100 years	1	0.4
	Total	**280**	**100**
Mean Age	46.1 years		
Standard Deviation	11.7 years		
Sex	Female	216	77.1
	Male	64	22.9
	Total	**280**	**100**
Education	None	34	12.1
	Primary	70	25.0
	Secondary	139	49.7
	Tertiary	37	13.2
	Total	**280**	**100**
Occupation	Employed	195	69.6
	Unemployed	80	28.6
	Student	5	1.8
	Total	**280**	**100**
Marital Status	Single	27	9.6
	Married	231	82.5
	Separated	9	3.2
	Widowed	13	4.7
	Total	**280**	**100**

Source: Field Survey

List of Opportunistic Infections and their Prevalence

A total of eleven (11) opportunistic infections were detected from the study. They include, Oral Candidiasis, Tuberculosis, and Itching with Body Rash, Pruritus, Herpes Zoster, Herpes Simplex, Vaginal Candidiasis, Genital Ulcers, Cough, Candida Albicans and Hypertension.

Between January 2020 and December 2020, the opportunistic infection which had the highest prevalence was pruritus with a prevalence of 2.5%. This is followed by tuberculosis and cough, both having a prevalence of 1.4% each. Herpes zoster has the 3rd highest prevalence of 1.1%. Oral candidiasis and Genital Ulcers have a prevalence of 0.7% each. Herpes simplex, vaginal candidiasis and hypertension occurs in 0.4% of the patients each. In all, 91% of patients are without opportunistic infections.

However between January 2021 and May 2022, there were a total of 92.4% patients without any opportunistic infection. Pruritus occurred most with a prevalence of 2.1%, followed by tuberculosis, which was 1.4%. Oral candidiasis and itching with body rash have a prevalence of 0.7 each, while genital ulcers and cough, vaginal

candidiasis, and candida albicans have a prevalence of 0.4% each. (Table 2)

Table 2: Distribution of Respondents by the Type of Opportunistic Infection

Variable	Type	Frequency	Percentage %
Opportunistic Infection between (January 2020-December 2020)	None	255	91
	Herpes Simplex	1	0.4
	Oral Candidiasis	2	0.7
	Tuberculosis	4	1.4
	Pruritus	7	2.5
	Herpes Zoster	3	1.1
	Vaginal Candidiasis	1	0.4
	Genital Ulcers	2	0.7
	Cough	4	1.4
	Hypertension	1	0.4
	Total	**280**	**100**
Opportunistic Infection between (January 2021-May 2022)	None	259	92.4
	Oral Candidiasis	2	0.7
	Tuberculosis	4	1.4
	Itching with Body Rash	2	0.7
	Pruritus	6	2.1
	Herpes Zoster	3	1.1
	Vaginal Candidiasis	1	0.4
	Genital Ulcers	1	0.4
	Cough	1	0.4
	Candida Albicans	1	0.4
	Total	**280**	**100**

Source: Field Survey

Prevalence of Opportunistic Infections

Based on the presence or absence of opportunistic infections, it was noted that 260 patients, 92.9% have no record of opportunistic infections. However, the remaining 20 patients (7.1%) have records of at least one opportunistic infection between January 2020 and May 2022. (see Table 3) (Figure 1)

Table 3: Distribution of Respondents by Presence or Absence of Opportunistic Infection

Variable	Option	Frequency	Percentage %
Opportunistic Infection	No	260	92.9
	Yes	20	7.1
	Total	**280**	**100.0**

Source: Field Survey

Result of Utilization of INH (Isoniazid) Prophylaxis

Utilization of INH prophylaxis is a preventive measure for the occurrence of Tuberculosis. INH is being given to patients after assessing their eligibility. Patients are eligible for INH prophylaxis based on the following factors first, if they are newly enrolled patients without tuberculosis second, if they are old patients who for some reason had not been on the INH prophylaxis in the past 2 years. Third, if they are old patients who had the INH prophylaxis in the past two years (hence the INH prophylaxis is given every two years).

From the data collected, between January 2020 and December 2022, 32.1% of patients were on the INH prophylaxis based on their eligibility status. Between January 2021 and May 2022 however, only 7.9% of the patients were on the INH prophylaxis. (Table 4)

Table 4: Distribution of Respondents by utilization of INH (Isoniazid) Prophylaxis

Variable	Option	Frequency	Percentage %

INH Prophylaxis (12 months) (January 2021-May 2022)	Yes	22	7.9
	No	258	92.1
	Total	**280**	**100**
INH Prophylaxis (2 years) (January 2020-December 2020)	Yes	90	32.1
	No	190	67.9
	Total	**280**	**100**

Source: Field Survey

Rate of Enrollment for Health Care

21 respondents (0.4%) were enrolled in health care between 2002 - 2006, 48 (17.1%) between 2007-2011, 103 (36.8%) between 2012-2016, and 128 (45.7%) between 2017-2021. This indicated an increase in the testing rate between 2012-2016 and 2017-2021. Hence more HIV patients are being captured and enrolled in health care. (Table 5)

Table 5: Distribution of respondents by Year of enrolment

Variable	Category	Frequency	Percentage (%)
Year Group	2002-2006	21	0.4
	2007-2011	48	17.1
	2012-2016	103	36.8
	2017-2021	128	45.7
	Total	**280**	**100**

Source: Field Survey

Viral Load Test

Viral load tests are used to track patients' health status. A high viral load signifies that the patient is not virally suppressed and could be at risk of contracting opportunistic infections while a low or undetectable viral load signifies a virally suppressed patient. From the table below, in the viral load tests carried out from January 2022 to May 2022, 69% of the patients have a viral load of <20 cp/ml. In 2021, 65.7% had a viral load of <20cp/ml, and in 2020, a total of 58.2% had a viral load of <20cp/ml. (see Table 6) A total of 84.2% were virally suppressed with a viral load of less than 200 in 2020, 88% in 2021, and 92.7% were virally suppressed in 2022.

Table 6: Distribution of respondents by Viral Load

Variable	Category (copies/ml)	Frequency	Percentage %
Available Viral Load (Jan 2020-December 2020)	Undetectable	26	14.7
	<20	77	43.5
	21-200	46	26.0
	>200	28	15.8
	Available	**177**	**100**
Available Viral Load (Jan 2021-December 2021)	Undetectable	60	23.9
	<20	105	42.4
	21-200	54	21.7
	>200	30	12.0
	Available	**251**	**100**
Viral Load (January 2022-May 2022)	Undetectable	52	54.7
	<20	14	14.8
	21-200	22	23.2
	>200	7	7.4
	Available	**95**	**100**

Source: Field Survey

Key Informant Interview

A total of 6 health workers were interviewed to get their perspectives on opportunistic infections among people living with HIV.

Opportunistic infections are microbial infections that occur in hosts with suppressed individuals. This was ascertained by respondents. Respondent 1 said: *"Opportunistic infections are the infections that accompany people living with HIV. They are the presentations that mostly bring patients to the hospital."*

The most common opportunistic infection is tuberculosis. Respondents mentioned the opportunistic infections they are familiar with and they all mentioned tuberculosis first. However, respondent 2 said: *I am very familiar with tuberculosis and rashes. However, rashes is the most common.* Respondent 3 said: *The most common is TB. TB and HIV are like twins. Whoever has tuberculosis can have HIV and whoever has HIV can have TB. One of the symptoms of HIV is Tuberculosis. Hence when someone is coughing for more than two months, they are recommended to take the HIV test.*

Based on past studies, it is known that people who have high viral loads are more at risk of having opportunistic infections. All the respondents acknowledged this. Respondent 1 mentioned that: *People with very high viral loads usually come down with these opportunistic infections. Most especially those that are coming for the first time newly captured positive clients and those that are not complying with their medications.* Some respondents however mentioned that people with low low viral loads can have some opportunistic infections. Respondent 6 emphasized that: A*nyone can have some opportunistic infections like rashes based on personal body hygiene.*

The mortality rate has been greatly reduced due to the advent of HAART and the high level of adherence of the patients. Respondent 1 added that: *TB is the major cause of death of patients. Common with defaulters who stop taking their drugs and then come back with the full-blown HIV/AIDS.*

A low mortality rate was achieved because of the preventive measures that had been taken over time. Such measures include health education, intensive counseling for new patients, and more. Respondent 1 said: *We also give them health education concerning their adherence to medications and the importance of not missing clinic appointments.* Also, patients who miss their appointments are being tracked and brought back to care. *Newly captured HIV patients are usually given ARVs and sceptrin for the prevention of opportunistic infections.* Furthermore, viral load test and CD4+ count tests are being conducted and the results are tracked to know the health status of the patients and intervene when necessary as stated by respondent 5: *Checking of viral loads and CD4+ counts to know how healthy the patients are.* Lastly, a respondent mentioned that: *a suitable show of care and affection to clients helps those who are going through social rejection to positively feel that they are part and parcel of the society.*

There are so little challenges now as regards reducing the occurrences of opportunistic infections among those living with HIV. Respondent 1 confirmed this saying: *People are actually adhering to their drug regimens now unlike before when we first started. Back then, people might start, and after about 2 or 3 months when they felt better, they neglected their medications. But with constant education, they have been able to get better on their drugs. Hence the goal "95-95-95" can be achieved which means 95% of the population knows their HIV status, 95% who knows their HIV status are on HAART, and 95% of those on HAART are virally suppressed.* However, there are still few challenges such as poor adherence of dependent patients, most especially children. A respondent mentioned that: *there is still a challenge with the pediatrics unit. It is like the parents are not paying much attention to the way the children are taking their medications, so there is a lapse in that area. It is not all of them though, but just a few.* There is also a challenge with tracking due to documentation of wrong details. Respondents complain saying: *A lot of patients are so difficult to counsel. Patients lie a lot. They lie about their phone numbers and home addresses.*

DISCUSSION

In the study, the majority of the respondents were between 41 and 60 years old, with the mean age being 46.1 ± 11.7 years, which means that most of them were adults. Majority of the respondents were females (77.1%). This confirms that females are more at risk of being infected with the virus than males. This is in line with a report from UNAIDS noting that over half of the HIV patients population worldwide are women [5]. This could be due to the most common mode of transmission of the virus which is through sexual intercourse, and the recipient (the woman) is known to be at higher risk. Johnson and Laga affirmed that women are more likely than men to contract the virus in heterosexual transmission. The majority were married (82.5%) [13]

One common thing to people living with HIV/AIDS, most especially, those with full-blown AIDS, is the presence of opportunistic infections. These opportunistic infections are however due to compromised immunity in these individuals. This study, focusing on HIV-infected individuals without full-blown AIDS, revealed that opportunistic infections are present amongst people living with HIV. The study was designed to establish the prevalence of opportunistic infections in HIV-infected patients at SSHA (State Specialists Hospital Asubiaro). The prevalence of opportunistic infections was found to be 7.1% (see Table 3). Our finding is different from a

similar study in Ibadan, Oyo state, Nigeria which had an opportunistic infection prevalence of 46.6% [14-15]. This high difference in prevalence could be as a result of the time difference in which both types of research were carried out (2022 and 2017 respectively). The key informant interview conducted among the health workers caring for the HIV-infected people explained the fact that the prevalence of opportunistic infections used to be high some years back, with the most common opportunistic infection being tuberculosis. However, the various preventive measures taken have helped to reduce the occurrence of various opportunistic infections drastically. Over the years, the advent of HAART (Highly Active Antiretroviral Therapy) has helped to drastically reduce the viral loads of individuals on treatments and in turn, helped to boost their CD4+ counts resulting in a stronger body immunity to fight against opportunistic infections.

This study also revealed that the occurrence of opportunistic infections among people living with HIV is declining. Table 2 shows the prevalence of opportunistic infections between January 2020 and December 2020 and between January 2021 and May 2022. There was a decline in the prevalence of opportunistic infections from 9% to 7.6%. From the Key Informant Interview (KII) conducted, it was established amongst the health workers that fewer patients came down with opportunistic infections. They linked the reason to be due to the increase in the adherence of patients to their medications which drastically reduced their viral loads. They also noted that most people with infections were newly enrolled clients. It was also noted by the Nurse in charge of ART counseling that this high treatment adherence was not so many years back. However, due to consistent health education at every clinic visit and counseling at about 6 stages for newly enrolled HIV-infected patients, patients are now more aware of the importance of their adherence to their medications and personal care.

There are preventive measures that have been adopted against some opportunistic infections. For instance, there are the INH prophylaxes used for prevention against Tuberculosis. As of 2020, WHO reported that the prevalence of tuberculosis among people living with HIV was 21%, which is against this study which showed that tuberculosis has a prevalence of only 1.4%. This difference is due to the intervention of preventive measures such as the usage of INH prophylaxis. INH is given to newly enrolled clients for 6 months if the individual is not diagnosed with tuberculosis. The health workers explained that this is because the most common opportunistic infection amongst people living with HIV was known to be tuberculosis. If the patient already has tuberculosis, however, the TB is first treated before the commencement of INH.

Table 5 further shows how there is a low prevalence of opportunistic infections among people receiving treatments from SSHA compared to other studies in Nigeria. In 2020, 84% had a virally suppressed viral load of <200 cps/ml, in 2021, 88.% were virally suppressed, and in the first 6 months of 2022, 92.6% were virally suppressed.

The health workers who were interviewed noted that their patients were being educated on how to prevent the occurrence of opportunistic infections. This occurred on all clinic days during the health education. While the data for this research were being collected, it was noted at one of the health education sessions where feedback was demanded from the patients on how they could prevent being sick. They gave measures such as adherence to their medications, good personal hygiene, good nutrition, not overthinking about being infected by the virus, and early reporting of any complaints.

Conclusion

In conclusion, opportunistic infections remain the leading cause of morbidity in people living with HIV. However, the occurrence can be greatly reduced through preventive measures as discovered from these findings such as the usage of INH (Ionazaid) prophylaxis. Constant health education and comprehensive adherence counseling used by the health workers help to keep the patients well informed on the possibilities of having these infections and the way by which they can be prevented.

Recommendation

There should be continuous health education and intensive adherence counseling for new patients to ensure a reduced prevalence of opportunistic infections.

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