



Prevalence of Cryptococcal Infection among HIV Infected Patients Attending a Tertiary Hospital in South-west Nigeria

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Abstract: Background: Cryptococcal infection is a fungal infection often found in immunocompromised patients like HIV - AIDS. The infection is found in 2-7 cases per 100,000 of HIV - AIDS patients with a 12% fatality in USA. Approximately 625,000 deaths globally are reported yearly from cryptococcal infection. Sub - Saharan Africa has been reported to have the highest Cryptococcal infection mortality in HIV - AIDS patients annually. Aim: This study was conducted to determine the prevalence of Cryptococcal infection among HIV infected patients attending a tertiary Hospital in Nigeria to serve as a template for the necessary interventions required to combat the menace of the high morbidity and mortality associated with Cryptococcal infection in people living with HIV-AIDS. Materials and Method: This is a retrospective cross- sectional review of a 5 years (2021-2025) hospital records. A pro forma was used in collecting data from the hospital records. Analysis was done using descriptive statistical tool of the statistical package of social sciences version 27 to obtain frequency, percentages and bar chart while T- test was used to obtain P values for incidence of Cryptococcal infection and gender distribution among the study population. The level of statistical significance was set at a predetermined $P < 0.05$. Results: The prevalence of cryptococcal infection among the HIV infected patients in this study was 11.8% which indicates that more than one in ten patients in this cohort had evidence of Cryptococcal infection, reflecting a considerable burden in the population. A statistically significant difference ($P = 0.017$) of Cryptococcal infection was found by gender with higher seroprevalence of 16.7 in female compared to 4.8% in males suggesting a gender based disparity in infection risk within the cohort. Conclusion: Cryptococcal infection is a very relevant opportunistic infection among HIV - infected patients in Nigeria with overall prevalence of 11.8 percent with statistically significant association with gender, females having higher prevalence.

Keywords: Cryptococcal, Human Immunodeficiency virus (HIV), Prevalence.

INTRODUCTION

Cryptococcal infection is a fungal infection often found in immunocompromised patients like HIV- AIDS, Diabetes and post organ transplant patients and rarely seen in immunocompetent patients.¹

There are basically two species of *Cryptococcus* that can cause infection in man, *Cryptococcus neoformans* and *Cryptococcus gatti*.²

Cryptococcal infection in immunocompetent healthy individuals is usually caused by *Cryptococcus Neoformans* while *Cryptococcus gatti* is responsible for the infection seen in immunocompromised patients like HIV AIDS, post organ transplant, long term steroid usage.³

Approximately, 625,000 deaths globally are reported yearly from Cryptococcal infection.⁴ In USA Cryptococcal infection is found in 2-7cases per 100,000 of HIV-AIDS patients with 12% fatality ratio⁵. Sub- Saharan Africa has been reported to have the highest Cryptococcal infection mortality in HIV patients annually.⁶

Cryptococcus fungi are usually found in soil contaminated by Birds droppings and are responsible to Cryptococcal meningitis, an opportunistic infection. The fungus has polysaccharides glucuroxylomanna and glucoronoxylomannogalactan in its membrane capsule which are the major contribution to the virulence of the pathogen.⁷

Inhalation of the spores from the environment leads to infection which remains asymptomatic in immunocompetent individuals but spread from the initial site via haematogenous route in immunocompromised patients like people living with HIV- AIDS. Reactivation of the organism can also occur at the initial site even after many years if an individual becomes immunocompromised⁸ though the lungs remain the common portal of entry for the pathogen, the most common clinical manifestation of the infection is meningoencephalitis, symptoms of which include neck stiffness, photophobia, nausea, vomiting, fever and headache all within 1-2 weeks of the infection. However, symptoms may include skin rash, cough and dyspnea occasionally.⁹ Cryptococcal meningitis has been documented to be a major cause of morbidity and mortality in patients living with HIV-AIDS.² In Sub Sahara Africa Cryptococcal infection is the major cause of death in HIV- AIDS patient with low CD4 counts of < 200cells.¹¹ Mortality recorded in HIV - AIDS patients with Cryptococcal infection has been found to be higher than mortality recorded for HIV- AIDS with tuberculosis in Nigeria.¹² The severity of this was reported by a case study of two HIV-AIDS patients with Cryptococcal infection at University of Ilorin Teaching Hospital Ilorin, Nigeria who had treatment failure as a result of the unavailability of the necessary anti-fungal medication.¹³ Primary diagnostic tests for cryptococcal meningitis include cerebrospinal fluid analysis, culture and immunodiagnostic tests.

In this study, detection of the Cryptococcal antigen is carried out through immunodiagnostic tests of the serum using lateral flow assay.¹⁴

This antigen detection based method avail the opportunity of early diagnosis of Cryptococcal infection in HIV-AIDS patients thereby promoting awareness, early treatment intervention and control of the high morbidity and mortality associated with cryptococcal infection in this category of patients.¹² Therefore, the aim of this study to determine the prevalence of Cryptococcal infection in HIV infected patients attending a tertiary health institution in Ekiti State, Nigeria is expected to form a template for necessary interventions

required to combat the menace of the high morbidity and mortality associated with Cryptococcal infection in people living with HIV - AIDS in Nigeria.

MATERIALS AND METHODS

Study Design

This was a 5-year (2021-2025) cross-sectional retrospective review of hospital records to determine the Prevalence of Cryptococcal infection among HIV infected patients attending a Tertiary Health Institution, Federal Teaching Hospital, Ido Ekiti, Ekiti State, Southwest, Nigeria.

Study Instrument and Data Collection Method

Data was collected by a research assistant using a structured pro forma to extract necessary socio-demographic variables and cryptococcal screening results of retroviral positive patients from the Hospital records.

Data Management

Descriptive and inferential statistics were used in this study.

Data Analysis

Descriptive statistical tool of the statistical package of social sciences version 27 was used to obtain frequency, percentages, and bar chart, while T- test was used to obtain P values for incidence of cryptococcal infection and gender distribution among study population. The level of statistical significance was set at a predetermined $P < 0.05$.

RESULTS

Table 1: Age and gender distribution of participants

Variables	Categories	Frequency	Percentage
Age Group	0 - 20	4	7.8
	21 - 40	16	31.4
	41 - 60	26	51.0
	> 60	5	9.8
	Total	51	100.0
Gender	Male	21	41.2
	Female	30	58.8
	Total	51	100.0

A total of 51 HIV-infected patients were included in the study. The largest proportion of participants were aged 41-60 years, representing 26 individuals (51.0%). This was followed by those aged 21-40 years with 16 individuals (31.4%), while five participants (9.8%) were

above 60 years, and four (7.8%) were between 0 and 20 years. With respect to gender, females constituted 30 participants (58.8%), while 21 participants (41.2%) were males. This shows a predominance of middle-aged adults and female patients among the study population.

Table 2: Overall prevalence of cryptococcal infection

Variables	Frequency	Percentage
Cryptococcal Antigen- Positive	6	11.8
Cryptococcal Antigen- Negative	45	88.2

Out of the 51 HIV-infected patients screened, six individuals (11.8%) tested positive for cryptococcal antigen, whereas 45 individuals (88.2%) were negative. This indicates that more than one in ten patients in this cohort had evidence of cryptococcal infection, reflecting a considerable burden in this population.

Table 3: Yearly incidence of cryptococcal infection (2021-2025)

YEAR	CrAg-Positive: Frequency (%)	CrAg-Negative: Frequency (%)	Total: Frequency (%)	P- value
2021	1 (7.7)	12 (92.3)	13 (100.0)	0.098
2022	1 (33.3)	2 (66.7)	3 (100.0)	
2023	0 (0)	18 (100.0)	18 (100.0)	
2024	2 (14.2)	14 (85.8)	16 (100.0)	
2025	2 (66.7)	1 (33.3)	3 (100.0)	

Key: CrAg = Cryptococcal Antigen; % = Percentage

The yearly distribution of cryptococcal antigenemia revealed fluctuations across the study period. In 2021, one case (7.7%) was identified among 13 participants, while in 2022, one of the three participants screened was positive, representing 33.3%. No cases were detected in 2023 despite 18 individuals being tested. In 2024, two cases were recorded among 16 participants (14.2%), while in 2025, two out of three participants tested positive, giving the highest proportion at 66.7%. Despite these variations, statistical analysis showed no significant difference across the years ($p = 0.098$). The observed annual differences should be interpreted with caution due to the small denominators in certain years, particularly 2022 and 2025.

Table 4: Gender distribution of cryptococcal infection

Gender	CrAg-Positive: Frequency (%)	CrAg-Negative: Frequency (%)	P- Value
Male	1 (2.0)	20 (39.2)	0.017
Female	5 (9.8)	25 (49.0)	
Total	6 (11.8)	45 (88.2)	

Key: CrAg = Cryptococcal Antigen; % = Percentage

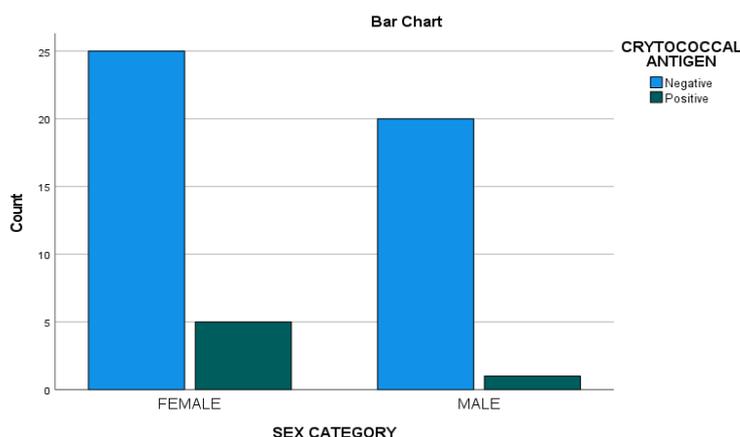


Figure 1: Seroprevalence of Cryptococcal Antigen among HIV-Infected Subjects Based on Gender Category

Key: Female - 5/30 (16.7%), Male - 1/21 (4.8%)

Analysis of cryptococcal infection by gender revealed a statistically significant difference ($p = 0.017$). Among males, only one individual was positive, representing 2.0% of the total sample and 4.8% of all male participants (1/21). In contrast, five females tested positive, constituting 9.8% of the total sample and 16.7% of all female participants (5/30). These findings demonstrate a higher seroprevalence of cryptococcal antigen among female participants compared with males, suggesting a gender-based disparity in infection risk within this cohort

Table 5: Age Distribution of Cryptococcal among HIV-Infected Subjects Enrolled in the Study

VARIABLES	Categories	CrAg-Positive	CrAg-Negative	P- Value
Age Group	0 - 20	0 (0)	4 (6.92)	0.13
	21 - 40	2 (3.93)	14 (24.21)	
	41 - 60	3 (5.90)	29 (50.15)	
	> 60	1 (1.97)	4 (6.92)	
	Total	6 (11.8)	(88.2)	

The age-based distribution showed that no cases were recorded among participants aged 0-20 years, while two cases (3.93% of the total) occurred in the 21-40 years age group, and three cases (5.90% of the total) were found in the 41-60 years group. One case (1.97% of the total) was detected among those above 60 years. When considered within age strata, this corresponded to a prevalence of 12.5% (2/16) in the 21-40 years group, 11.5% (3/26) in the 41-60 years group, and 20.0% (1/5) in the >60 years group. Although there appeared to be a higher proportion of positivity in the oldest age category, statistical analysis did not show a significant association between age and cryptococcal antigenemia ($p = 0.130$)

DISCUSSION

This is a cross - sectional study of retrospectively collected data to determine the prevalence of cryptococcal infection in HIV infected adults attending a tertiary Hospital, south western Nigeria.

A total of fifty -one (51) HIV infected patients' data over the five (5) years study period (2021-2025) were retrieved and analyzed. Females constituted 30 participants (58.8%), while 21 participants (41.2%) were males. This shows a predominance of female with Cryptococcal antigen compared to their male counterparts. The overall prevalence of cryptococcal infection obtained in this study was 11.8 percent which indicates that more than one in ten patients in this cohort had evidence of cryptococcal infection, reflecting a considerable burden and how wide spread cryptococcal infection is among HIV infected patients. The prevalence of 11.8 recorded in this study aligned with some studies carried out in Nigeria where a prevalence of 2.2-13.1 % were reported.^{15,16,17}

The gender distribution revealed a statically significant difference ($p=0.017$) thereby suggesting a gender based disparity in infection risk within this cohort. This finding was consistent with the study carried out by Osazuwa et al¹⁷ and Ogbam O.M. et al.¹⁸

The age based distribution in this study showed there was no significant association between age and cryptococcal antigenemia even though the highest prevalence was obtained for age group 21-40 years. This finding fall within the range of the findings of Ogba O.M et al¹⁸ in which the peak prevalence for cryptococcal infection was reported as above 25years.

The fluctuations in yearly distribution observed across the study period was not statically significant ($p=0.098$) however, this has to be interpreted with caution bearing in mind the small denominators observed in the year 2022 and 2025.

Overall, the findings in this study underscore the importance of routine or targeted cryptococcal antigen screening among HIV infected patients. The need for early detection and prompt management is very germane and could play a critical role in reducing the morbidity and mortality associated with cryptococcal meningitis particularly given the high burden of the advanced HIV disease in Sub- Sahara Africa.

CONCLUSION

This study demonstrated that cryptococcal infection remains a relevant opportunistic infection among HIV-infected patients attending a tertiary hospital in Nigeria, with an overall prevalence of 11.8 percent. The findings highlight that although cryptococcal antigenemia was observed across different age groups, no significant association with age was found. Gender, however, showed a statistically significant association, with females having a higher prevalence compared with males. Temporal variations in the yearly distribution of cryptococcal infection were noted but did not reach statistical significance, likely due to small yearly sample sizes.

Limitation

1. Data obtained was limited to a study site which represents a small fraction of south western Nigeria.

2. Tendency to miss out data as a result of possible incomplete records from the secondary data available and used in this study.

Financial support and sponsorship

Nil

Conflicts of interest

There are no conflicts of interest.

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