

## Prevalence and factors contributing to urogenital tuberculosis among HIV patients attaining healthcare at Hoima Regional Referral Hospital. A cross-sectional study.

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### ABSTRACT

#### Background:

The study aimed to determine the prevalence and factors contributing to urogenital tuberculosis among HIV-positive patients attending healthcare at Hoima Regional Referral Hospital.

#### Methodology:

A hospital-based retrospective cross-sectional study design utilizing secondary data was employed. Data were collected from patient medical records, ART clinic registers, and laboratory records of HIV-positive patients. A total of 112 patient records meeting the inclusion criteria were reviewed using a structured data extraction form. Data analysis was performed using SPSS version 26. Descriptive statistics including frequencies and percentages were used to summarize the findings, while Chi-square tests were used to determine associations between study variables and urogenital tuberculosis.

#### Results:

Among 112 HIV-positive patient records, 65 (58.0%) were female and 47 (42.0%) male. The largest age group was 36-45 years, 41 (36.6%), while 18-25 years accounted for 18 (16.1%). Semi-urban residents were 46 (41.1%), urban 32 (28.6%), and rural 34 (30.3%). Married participants were 51 (45.5%), single 39 (34.8%), divorced/separated 15 (13.4%), and widowed 7 (6.3%). Primary education accounted for 39 (34.8%), secondary 37 (33.0%), tertiary 20 (17.9%), and no formal education 16 (14.3%). Employed participants were 63 (56.3%) and unemployed 49 (43.7%). Urogenital tuberculosis was diagnosed in 14 (12.5%) records, while 98 (87.5%) were negative. Prevalence was 17.0% among males and 9.2% among females. By age, prevalence ranged from 5.6% to 16.7%. Rural residence was recorded at 14.7%, divorced at 20.0%, no formal education at 25.0%, and unemployment at 16.3%.

#### Conclusion:

Urogenital tuberculosis remains a significant public health concern among HIV-positive patients at Hoima Regional Referral Hospital, with socio-demographic factors influencing its occurrence.

#### Recommendation:

The study recommends strengthening routine TB screening, early diagnosis, access to diagnostic tests, health education, and integrated TB/HIV services among HIV-positive patients.

**Keywords:** Tuberculosis, Urogenital tuberculosis, TB screening, Extrapulmonary tuberculosis, GeneXpert.

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### BACKGROUND OF THE STUDY

Tuberculosis (TB) is a serious disease caused by *Mycobacterium tuberculosis*, which commonly affects the lungs but can also affect other parts of the body. (Nyatichi & Amimo, 2016).

Urogenital tuberculosis (UGTB) is the second most common form of extrapulmonary tuberculosis (EPTB), contributing to 2-20% of tuberculosis, with more than 90% of cases occurring in developing countries. (Figueiredo *et al.*, 2017).

In UGTB, *Mycobacterium tuberculosis* is not usually sexually transmitted but spreads hematogenously from the

lungs to the urogenital tract, and occasionally via lymphatics or direct extension from nearby organs. In the kidneys, granulomas may form and gradually progress to Fibrosis, strictures, and hydronephrosis. HIV positive patients are at a high risk because of immunosuppression, which allows the infection to spread more and in unusual ways (Figueiredo *et al.*, 2017).

Urogenital Tuberculosis symptoms are usually nonspecific, but patients might have frequent urination, painful urination, and hematuria. Recurrent urinary tract infections that do not respond to standard antibiotics are involved. Men may present with chronic epididymo-orchitis or prostatitis,

whereas women may have menstrual irregularities or infertility. Advanced disease can result in ureteric obstruction and irreversible kidney damage, because these signs often overlap with more common urological or reproductive disorders; UGTB may not be ruled out unless specifically investigated. (Muneer *et al.*, 2019).

The WHO global TB report of October 2021 stated that in 2020 the largest number of TB cases occurred in South-Eastern Asia with about 43%, followed by Africa with 25% of the new cases and the Western Pacific with 18% of 10 million new cases diagnosed with TB annually. 15 to 40% present with Extra-pulmonary TB, and a considerable portion have UGTB (Muneer *et al.*, 2019).

Africa has 75% of about 1.03 million TB/HIV co-infection cases that occur each year globally. TB is often found first in HIV-positive patients, and it is one of the leading causes of death among them. The prevalence of UGTB among notified TB patients in Africa in 2017 was 16%, which is second to the Eastern Asia region 24% which is more than the global prevalence of EPTB. (Muhammed *et al.*, 2018). TB epidemic in East Africa is because of high prevalence of HIV, whereby at least 5 to 45% have TB, and those with EPTB are 5-7% (Muneer *et al.*, 2019).

According to some reports, around 40% of active tuberculosis cases in Uganda are never reported to the national register. There are people living with TB but are not aware of the status and are potentially transmitting it.

The survey conducted showed that about 24% of TB patients are co-infected with HIV nationwide (TB, 2019) (MINISTRY OF HEALTH, 2019).

Traditional urine acid-fast bacilli (AFB) smears can be used for diagnosis but have low sensitivity; culture and sensitivity, although more accurate, are slow and resource-intensive. Molecular methods such as GeneXpert MTB/RIF provide faster results and also detect drug resistance, even though sensitivity is low in extrapulmonary samples. Urine LAM assays (AlereLAM, FujiLAM) are the latest rapid diagnostic tests that can be especially helpful for HIV-positive patients with advanced immune suppression, that is to say those with a CD4 count below 200 (Broger *et al.*, 2020). The study aimed to determine the prevalence and factors contributing to urogenital tuberculosis among HIV-positive patients attending healthcare at Hoima Regional Referral Hospital.

## METHODOLOGY

### Study design.

The study used a hospital-based retrospective cross-sectional study design employing quantitative methods of data collection. Secondary data were obtained from patient medical records, ART clinic registers, and laboratory records of HIV-positive patients attending Hoima Regional Referral Hospital. The retrospective cross-sectional study design was appropriate because it enabled the researcher to determine the prevalence of urogenital tuberculosis and

identify factors contributing to the disease among HIV-positive patients at a specific point in time.

### Study area.

The study was conducted at Hoima Regional Referral Hospital located in Hoima City, Western Uganda. The hospital serves as the major referral facility for the Bunyoro sub-region and receives patients from districts including Hoima, Masindi, Kikuube, Kagadi, Bulisa and Kiryandongo. The hospital has an ART clinic and tuberculosis treatment unit which provide HIV care, tuberculosis screening, diagnosis, treatment, and monitoring services. The hospital maintains patient medical records and laboratory registers that provide secondary data for the study.

### Study population.

The study population consisted of medical records of HIV-positive adult patients with a CD4 count below 200 cells/mm<sup>3</sup> who attended the ART clinic at Hoima Regional Referral Hospital during the study period.

### Selection criteria.

#### Inclusion criteria.

The study included:

Medical records of HIV-positive patients aged 18 years and above

Records of patients with a CD4 count below 200 cells/mm<sup>3</sup>

Records with complete information relevant to the study variables.

#### Exclusion criteria.

The study excluded:

Medical records with incomplete or missing key information  
Records of patients currently receiving anti-tuberculosis treatment

Records that do not meet the study inclusion criteria.

### Sample size determination.

The sample size was determined using the Kish and Leslie (1965) formula for estimating a single population proportion:  $n = Z^2 P(1-P)/d^2$

$$n = \frac{Z^2 p(1-p)}{d^2}$$

Where n = minimum sample size required

Z = standard normal deviation at 95% confidence interval (1.96)

p = estimated prevalence of urogenital tuberculosis among HIV-positive patients (15%)

d = margin of error (0.07)

Substituting in the formula:  $n = \frac{1.96^2 \times 0.15(1-0.15)}{0.07^2}$   
 $n = 100$

The calculated sample size was approximately 100 participants.

Considering a 10% allowance for incomplete records:  $n = \frac{n}{1-r}$  where r: incomplete records percentage, which  $r=0.1$   
 $n_{adjusted} = \frac{100}{1-0.1} = 112$  records.

Therefore, a total sample size of 112 medical records was reviewed in the study.

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### **Sampling technique.**

A convenience sampling technique was used to select eligible patient records from the ART clinic registers and medical records at Hoima Regional Referral Hospital.

All available records meeting the inclusion criteria during the study period were reviewed until the required sample size of 112 records was achieved.

### **Sampling procedure.**

Permission to access patient medical records and ART clinic registers was first obtained from the administration of Hoima Regional Referral Hospital.

The researcher identified records of HIV-positive patients who met the inclusion criteria. The available eligible records were then reviewed using convenience sampling.

Data were continuously extracted from the selected records until the required sample size of 112 records was obtained. Records with incomplete or missing important information were excluded and replaced with other eligible records.

### **Data collection method.**

A retrospective secondary data collection method was used in this study. Data were collected through review of existing patient records from the ART clinic registers, laboratory registers, and patient medical files at Hoima Regional Referral Hospital.

The researcher reviewed records of HIV-positive patients who met the study inclusion criteria and extracted relevant information using a structured data extraction form. Information collected included socio-demographic characteristics, clinical history, and laboratory findings related to urogenital tuberculosis.

Laboratory data on urogenital tuberculosis diagnosis were obtained from available laboratory records and patient files. The collected data were checked for completeness and accuracy before being entered into SPSS version 26 for analysis.

### **Data collection tools.**

The main data collection tool was a structured data extraction form designed by the researcher.

The tool was used to obtain information from patient medical records, ART clinic registers, and laboratory records. The extraction form included sections for socio-demographic data, clinical information, behavioural factors, health-system factors, and laboratory findings.

Each reviewed record was assigned a unique identification code to maintain confidentiality.

### **Data collection procedure.**

After obtaining ethical approval and permission from hospital administration, the researcher accessed ART clinic registers, patient medical records, and laboratory registers. Eligible records meeting the inclusion criteria were identified and reviewed.

The researcher extracted relevant information using the data extraction form.

Completed extraction forms were checked daily for completeness and accuracy before data entry.

### **Research variables.**

#### **Dependent variable.**

Presence of urogenital tuberculosis among HIV-positive patients.

#### **Independent variables.**

Socio-demographic factors: age, sex, education level, occupation, marital status.

### **Quality control.**

Several measures were implemented to ensure the quality of data collected.

The data extraction form was pre-tested before the actual study to ensure clarity and consistency. A pilot study was conducted at Kikuube Health Centre IV using approximately 10% of the study sample.

The pilot study helped assess the clarity, consistency, and suitability of the data extraction form.

Necessary corrections and adjustments were made before the actual data collection process began.

The researcher carefully reviewed all records to ensure that only eligible records were included in the study.

Completed extraction forms were checked daily for completeness and accuracy.

Data entry into SPSS version 26 was also double-checked to minimize errors.

### **Data analysis and presentation.**

Collected data were entered into SPSS version 26 for analysis.

Descriptive statistics including frequencies, percentages, tables, and pie charts were used to summarize the findings.

The analysed results were presented using tables and pie charts for easy interpretation.

### **Ethical considerations.**

Patient names were not recorded; only unique codes were used.

Data were stored securely in a password-protected file/locked storage.

Access was limited to the research team only.

Data were used strictly for academic purposes.

## RESULTS

### Socio-demographic characteristics of participants from records.

The study assessed socio-demographic characteristics including sex, age, residence, marital status, education level, and employment status.

Page | 4 **Table 1 Socio-demographic characteristics of patients from records**

| Variable          | Category            | Frequency (n=112) | Percentage (%) |
|-------------------|---------------------|-------------------|----------------|
| Sex               | Male                | 47                | 42.0           |
|                   | Female              | 65                | 58.0           |
| Age Group (Years) | 18–25               | 18                | 16.1           |
|                   | 26–35               | 29                | 25.9           |
|                   | 36–45               | 41                | 36.6           |
|                   | Above 45            | 24                | 21.4           |
|                   |                     |                   |                |
| Residence         | Urban               | 32                | 28.6           |
|                   | Semi-urban          | 46                | 41.1           |
|                   | Rural               | 34                | 30.3           |
| Marital Status    | Single              | 39                | 34.8           |
|                   | Married             | 51                | 45.5           |
|                   | Divorced/Separated  | 15                | 13.4           |
|                   | Widowed             | 7                 | 6.3            |
| Education level   | No formal education | 16                | 14.3           |
|                   | Primary             | 39                | 34.8           |
|                   | Secondary           | 37                | 33.0           |
|                   | Tertiary            | 20                | 17.9           |
| Employment status | Employed            | 63                | 56.3           |
|                   | Unemployed          | 49                | 43.7           |
| <b>Total</b>      |                     | <b>112</b>        | <b>100</b>     |

From Table 1, the majority of records were female, 65(58.0%), while males were 47(42.0%). Most records belonged to the age group of 36–45 years, 41(36.6%). Most participants resided in semi-urban areas, 46(41.1%), while the least were from urban areas, 32(28.6%). Regarding marital status, married respondents constituted the highest proportion, 51(45.5%). Participants in records with primary education were the majority, 39(34.8%), and more than half of the participants, 63(56.3%), were employed in records.

### Prevalence of urogenital tuberculosis among HIV-positive patients

Out of the 112 HIV-positive patient records reviewed, 14 patients were diagnosed with urogenital tuberculosis, while 98 patients were negative. The overall prevalence of urogenital tuberculosis was therefore found to be 12.5%.

**Table 2: prevalence of urogenital tuberculosis among HIV-positive patients**

| Urogenital TB status | Frequency  | Percentage (%) |
|----------------------|------------|----------------|
| Positive             | 14         | 12.5           |
| Negative             | 98         | 87.5           |
| <b>Total</b>         | <b>112</b> | <b>100</b>     |

From Table 2, the findings indicate that urogenital tuberculosis remains a significant health problem among

HIV-positive patients attending Hoima Regional Referral Hospital. The prevalence of 12.5% suggests that

approximately 1 in every 8 HIV-positive patients had urogenital tuberculosis.

### Prevalence of urogenital tuberculosis by sex

The study further analysed the prevalence of urogenital tuberculosis according to sex.

Page | 5 **Table 3 Prevalence of urogenital tuberculosis by sex**

| Sex          | UGTB positive | Prevalence (%) |
|--------------|---------------|----------------|
| Male         | 8             | 17.0           |
| Female       | 6             | 9.2            |
| <b>Total</b> | <b>14</b>     | <b>12.5</b>    |

From Table 3, the prevalence of urogenital tuberculosis was higher among male respondents, 8(17.0%), compared to female respondents, 6(9.2%). This finding suggests that male HIV-positive patients may be at a relatively higher risk of developing urogenital tuberculosis.

### Prevalence of urogenital tuberculosis by age group

**Table 4: Prevalence of urogenital tuberculosis by age group**

| age group       | UGTB Positive | Total records (n) | Prevalence (%) |
|-----------------|---------------|-------------------|----------------|
| 18–25           | 1             | 18                | 5.6            |
| 26–35           | 3             | 29                | 10.3           |
| 36–45           | 6             | 41                | 14.6           |
| Above 45        | 4             | 24                | 16.7           |
| <b>Total(N)</b> | <b>14</b>     | <b>112</b>        | <b>12.5</b>    |

The findings in Table 4 show that the prevalence of urogenital tuberculosis (UGTB) increased with age among the study participants. Participants aged 18–25 years had the lowest prevalence, with 1 out of 18 participants testing positive, giving a prevalence of 5.6%. Among participants aged 26–35 years, 3 out of 29 participants were UGTB positive, corresponding to a prevalence of 10.3%. The age

group of 36–45 years recorded 6 positive cases out of 41 participants, giving a prevalence of 14.6%. Participants aged above 45 years had 4 positive cases out of 24 participants, representing the highest prevalence of 16.7%. Overall, 14 out of 112 participants tested positive for UGTB, giving an overall prevalence of 12.5%.

**Table 5: Prevalence of urogenital tuberculosis (N=112)**

| Variable                 | UGTB positive | Total number of records (n) | Prevalence (%) |
|--------------------------|---------------|-----------------------------|----------------|
| <b>Residence</b>         |               |                             |                |
| Urban                    | 3             | 32                          | 9.4            |
| Semi-urban               | 6             | 46                          | 13.0           |
| Rural                    | 5             | 34                          | 14.7           |
| <b>Marital status</b>    |               |                             |                |
| Single                   | 4             | 39                          | 10.3           |
| Married                  | 6             | 51                          | 11.8           |
| Divorced                 | 3             | 15                          | 20.0           |
| Widowed                  | 1             | 7                           | 14.3           |
| <b>Education level</b>   |               |                             |                |
| No formal                | 4             | 16                          | 25.0           |
| Primary                  | 5             | 39                          | 12.5           |
| Secondary                | 3             | 37                          | 8.1            |
| Tertiary                 | 2             | 20                          | 10.0           |
| <b>Employment status</b> |               |                             |                |
| Employed                 | 6             | 63                          | 9.5            |
| Unemployed               | 8             | 49                          | 16.3           |

From Table 5, the prevalence of urogenital tuberculosis was highest among records of patients from rural areas (14.7%), followed by semi-urban (13%), then urban with the lowest prevalence (9.4%). In the same way, records of divorced individuals had the highest prevalence (20.0%), then those who were divorced or separated, followed by widowed (14.3%). Married individuals had a prevalence of 11.8%, while single individuals had the lowest prevalence (10.3%). The prevalence of urogenital tuberculosis was highest among those with no formal education, and secondary education had the lowest prevalence (8.1%). This finding suggests that lower education levels may be associated with increased risk of urogenital tuberculosis. The prevalence of urogenital tuberculosis was higher among unemployed (16.3%) compared to employed (9.5%). This suggests that unemployment and related socioeconomic challenges may contribute to increased vulnerability to urogenital tuberculosis among HIV-positive patients.

## DISCUSSION

### Prevalence of urogenital tuberculosis among HIV-positive patients

The first objective of the study was to determine the prevalence of urogenital tuberculosis among HIV-positive patients accessing healthcare at Hoima Regional Referral Hospital.

Data analysis and interpretation revealed that out of 112 HIV-positive patients reviewed, 14 patients were diagnosed with urogenital tuberculosis, giving an overall prevalence of 12.5%.

These findings indicate that urogenital tuberculosis remains a significant health problem among HIV-positive patients despite the availability of TB/HIV collaborative services. The relatively high prevalence may be because HIV infection weakens the immune system, making patients more susceptible to extrapulmonary tuberculosis infections, including urogenital tuberculosis.

These findings agree with the findings of the World Health Organization (2024), which reported that extrapulmonary tuberculosis contributes significantly to the global burden of tuberculosis among immunocompromised individuals. The findings are also in agreement with Muneer A. et al. (2019), who reported that urogenital tuberculosis is among the most common forms of extrapulmonary tuberculosis in developing countries with high HIV prevalence.

Similarly, Mohammed A. Y. et al. (2018) found a high prevalence of extrapulmonary tuberculosis among HIV-positive populations in Sub-Saharan Africa due to immune suppression. The findings further agree with Cresswell F. V. et al. (2020), who reported a significant tuberculosis burden among HIV-positive patients in Uganda.

The researcher therefore interprets that urogenital tuberculosis continues to affect HIV-positive patients because of weakened immunity, delayed diagnosis, and

inadequate routine screening for extrapulmonary tuberculosis.

### Socio-demographic factors contributing to urogenital tuberculosis.

The second objective of the study was to determine the socio-demographic factors contributing to urogenital tuberculosis among HIV-positive patients accessing healthcare at Hoima Regional Referral Hospital.

Data analysis and interpretation revealed that male respondents had a higher prevalence of urogenital tuberculosis compared to females. Older respondents above 45 years were also more affected compared to younger age groups. In addition, respondents from rural and semi-urban areas, those with low education levels, and unemployed respondents showed relatively higher prevalence of urogenital tuberculosis.

These findings indicate that socio-demographic characteristics play an important role in the occurrence of urogenital tuberculosis among HIV-positive patients. The higher prevalence among males may be due to delayed healthcare-seeking behaviour, poor adherence to treatment, and increased exposure to risk factors such as substance use. The higher prevalence among older age groups may be because of prolonged exposure to infection and reduced immune function associated with aging.

The findings agree with Hirpa S. et al. (2022), who reported that males had a higher risk of tuberculosis compared to females among HIV-positive populations. The findings also agree with Zhao Y. et al. (2025), who found that tuberculosis infection is more common among older and economically productive age groups. This study found an overall prevalence of UGTB of 12.5% among HIV-positive patients. The high prevalence may be attributed to immunosuppression among HIV-positive individuals, which increases susceptibility to extrapulmonary tuberculosis, including UGTB. Previous studies have shown that HIV infection weakens cell-mediated immunity, thereby increasing the risk of tuberculosis infections in extrapulmonary sites (Sharma et al., 2020).

The prevalence of UGTB increased with age, with participants above 45 years having the highest prevalence (16.7%) while those aged 18–25 years had the lowest prevalence (5.6%). This may be due to prolonged exposure to *Mycobacterium tuberculosis*, declining immunity with increasing age, and coexistence of chronic illnesses among older individuals.

The findings are in agreement with studies conducted among HIV-positive patients in sub-Saharan Africa, which reported that extrapulmonary tuberculosis is more common among immunocompromised individuals and tends to increase with advancing age (WHO, 2023). The study therefore indicates that UGTB remains a significant public health problem among HIV-positive patients, highlighting

the need for routine screening and early diagnosis among high-risk groups.

The findings further agree with Shah S. et al. (2021), who reported that individuals living in rural and resource-limited settings had higher TB/HIV co-infection rates due to poor living conditions and limited healthcare access. Similarly, Onwubiko C. et al. (2024) found that low socioeconomic status and low education levels increased vulnerability to tuberculosis among HIV-positive individuals.

The researcher therefore interprets that social and economic factors significantly influence the occurrence of urogenital tuberculosis because they affect healthcare access, awareness, living conditions, and treatment adherence.

## CONCLUSION

The study established that the prevalence of urogenital tuberculosis among HIV-positive patients was 12.5%, indicating that urogenital tuberculosis remains a significant public health problem among people living with HIV.

The study further established that socio-demographic factors such as male sex, older age, low education level, unemployment, and rural or semi-urban residence were associated with the occurrence of urogenital tuberculosis among HIV-positive patients.

In view of these findings, the study concludes that socio-demographic factors significantly contribute to the occurrence of urogenital tuberculosis among HIV-positive patients attending Hoima Regional Referral Hospital.

## RECOMMENDATION

Healthcare workers at Hoima Regional Referral Hospital should strengthen routine screening for urogenital tuberculosis among HIV-positive patients, especially those in high-risk socio-demographic groups such as males, older adults, and those from low socioeconomic backgrounds.

The hospital administration should improve availability of diagnostic tests such as GeneXpert and urine LAM assays to support early detection of urogenital tuberculosis.

Healthcare providers should strengthen health education and counselling programs targeting HIV-positive patients on tuberculosis prevention and early health-seeking behaviour. The Ministry of Health should strengthen TB/HIV collaborative activities and increase community awareness about tuberculosis risk factors among HIV-positive populations.

Health education programs should be conducted regularly to educate HIV-positive patients about tuberculosis prevention and the importance of early diagnosis and treatment.

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## List of abbreviations

AFB - Acid-Fast Bacilli

AIDS - Acquired Immunodeficiency Syndrome

ART - Antiretroviral Therapy

BMI - Body Mass Index

CD4 - Cluster of Differentiation 4

DNA - Deoxyribonucleic Acid

EPTB - Extrapulmonary Tuberculosis

HIV - Human Immunodeficiency Virus

IPT - Isoniazid Preventive Therapy

LAM - Lipoarabinomannan

MTB - Mycobacterium tuberculosis

PLHIV - People Living with Human Immunodeficiency Virus

TB - Tuberculosis

UGTB - Urogenital Tuberculosis

UHPAB - Uganda Health Professionals Assessment Board

UTI - Urinary Tract Infection

WHO - World Health Organization

## Source of funding

The study had no funding.

## Conflict of interest

The authors declare no conflict of interest.

## Data availability

Data are available upon request from the author.

## Author contributions

**AB:** collected the data.

**JB:** supervised the study.

HN: supervised the study.

FS: supervised the study.

### Informed consent

Written informed consent was obtained from all participants prior to their inclusion in the study. Participants were informed about the purpose of the study, procedures involved, potential risks and benefits, and their right to withdraw at any time without penalty.

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