

Pulmonary Tuberculosis and its Associated Factors among HIV Positive Individuals attending Antiretroviral Therapy Clinic of Tertiary Care hospital in Ghorahi, Dang

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Abstract

Introduction: Human immunodeficiency virus (HIV) weakens the immune system by targeting CD4 cells. Pulmonary tuberculosis (PTB) is a bacteriologically confirmed or clinically diagnosed tuberculosis infection of the lung parenchyma or tracheobronchial tree. Prevalence of PTB is significantly high among HIV positive individuals. This study assessed the Pulmonary Tuberculosis and its associated factors among HIV positive individuals.

Methods: A descriptive cross-sectional study was conducted at ART clinic of Rapti Academy of Health Sciences (RAHS). After obtaining ethical approval from the Institutional Review Committee of RAHS, records of 299 HIV positive individuals attending the ART clinic from January to December 2024 were consecutively sampled and retrieved. Data analysis was performed using the Statistical Package for the Social Sciences version 16.

Results: Out of 299 HIV positive individuals, the majority (53.5%) were aged 40–59 years, with a median age of 41 years, and near-equal gender distribution. Most were Janajati (39.1%), married (69.6%), literate (73.6%), and unemployed (77.6%), with spouses of migrants (40.1%) and migrants (20.4%) being the key risk groups. Clinically, over half (51.2%) were in Stage I HIV, 94.3% had viral load testing, and 98.2% of those tested showed viral suppression. Pulmonary tuberculosis (PTB) was prevalent in 7.4% of HIV positive individuals. Among 47 individuals with other associated diseases, infections (29.7%) were most common.

Conclusion: This study highlights the ongoing challenge of PTB associated with HIV infection in Nepal, necessitating targeted interventions and integrated services. Further multi-center research is recommended to explore socioeconomic and clinical determinants of PTB among HIV-positive individuals.

Keywords: ART; cross-sectional study; human immunodeficiency virus; Nepal; pulmonary tuberculosis; RAHS

Introduction

Human immunodeficiency virus (HIV) is an infection that targets and weakens the body's immune system, particularly the white blood cells called CD4 cells. HIV destroys these CD4 cells, compromising the immune system and making individuals more vulnerable to opportunistic infection, such as tuberculosis and fungal

infections, severe bacterial infections and some cancers.¹ The first case of HIV in Nepal was detected in 1988.² In Nepal, there are estimated 30,000 adults and children living with HIV.³ Pulmonary tuberculosis (PTB) is defined as any bacteriologically confirmed or clinically diagnosed case of tuberculosis which involves the lung parenchyma or the tracheobronchial tree.⁴ It spreads through the air when people with TB cough, sneeze or spit.⁵ Nepal faces

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a significant TB burden, with an estimated 70,000 total cases, reflecting an incidence rate of 229 per 100,000 populations. Among these, HIV-related TB accounts for 540 cases, with an incidence rate of 1.8 per 100,000 populations.² Prevalence of PTB found among HIV positive patients on ART was found to be moderately high.^{6,7} Male gender showed a significant association with PTB among HIV patients.⁷⁻⁹ This study aims to assess the pulmonary tuberculosis and its associated factors among HIV positive individuals attending antiretroviral therapy clinic of tertiary care hospital.

Methods

The study was descriptive cross-sectional study. Data were systematically extracted from the HIV treatment care register at ART clinic of Rapti Academy of Health sciences. Consecutive Sampling was used to select HIV positive individuals meeting the inclusion criteria from the HIV treatment care register from the timeline between January and December 2024. Records of HIV-positive individuals who were newly diagnosed with pulmonary tuberculosis (PTB) confirmed by GeneXpert MTB test (which detects *Mycobacterium tuberculosis*) and those previously diagnosed with PTB currently receiving anti-tuberculosis treatment (ATT), underwent sputum testing for acid-fast bacilli (AFB) were documented at ART centre. Based on this record, PTB cases among HIV-positive individuals were identified. Ethical clearance letter was taken from IRC-RAHS with Ref. No. 1684. Permission letter also obtain from Rapti Academy of Health Sciences with Ref. No. 1682. The inclusion criteria were records of all HIV positive individuals with complete data between the study periods. Data entry was done in Epidata and data was analyzed on SPSS Version 16.0. Descriptive and inferential analyses were performed using frequency, cross tabs and chi-square test. P value of <0.05% was considered as statistically significant at 95% confidence intervals (CI).

Results

In the year 2024 from January to December, there were 299 HIV positive individuals attending the ART clinic of Rapti Academy of Health Sciences.

Table 1 shows that out of 299 HIV positive individuals, the maximum number of individuals were 40-59 years of age. The median age of the patients was 41 years. Females made up the largest proportion at 49.2%, closely followed by males at 48.5%, while others (including transgender) accounted for 2.3%. In terms of ethnicity, 117 participants were from Janajati (39.1%) and Brahmin/Chhetri 109 (36.5%) groups, followed by 59 participants from Dalit group (19.7%), and a small proportion from Madhesi (0.3%). More than two third individuals were married (69.6%). The majority (73.6%) were literate, while 26.4% being illiterate.

Among the 220 literate participants, most had completed primary education (58.2%), followed by secondary education (31.8%). A smaller proportion had attained higher secondary education (7.7%), while only 2.3% had a bachelor's degree or higher. Among the 299 participants, the majority (77.6%) were unemployed, while 22.4% were employed. Among the 67 employed individuals, the average monthly income was reported by 64 participants. Of these, 76.1% earned $\leq$ 20,000 NPR, 19.4% earned between 20,000 and 50,000 NPR, and 4.5% did not state their income.

According to Government of Nepal; Ministry of Health, individuals at higher risk for HIV were categorized into the following groups: sex workers (SWs), clients of sex worker (SW), men who have sex with men (MSM), migrants, spouses of migrants, vertical transmission cases, and transgender individuals. While if the individual's risk group attending the ART clinic of RAHS was unknown, it was labelled as unknown group. Out of 299 individuals assessed for risk group categories, the largest proportion (40.1%) were spouses of migrants, followed by migrants (20.4%).

Table 1: Socio-demographic characteristics of HIV positive individuals

Socio-demographic characteristics	Frequency (n)	Percentage (%)
Age in years (Median age = 41 years, n=299)		
0-9 years	6	2.0
10-19 years	18	6.0
20-39 years	102	34.1
40-59 years	160	53.5
60 years and above	13	4.3
Gender (n=299)		
Male	145	48.5
Female	147	49.2
Others	7	2.3
Ethnicity (n=299)		
Brahmin and Chhetri	109	36.5
Dalit	59	19.7
Janajati	117	39.1
Madhesi	1	0.3
Muslim	2	0.7
Others	11	3.7
Marital Status (n=299)		
Unmarried	42	14.0
Married	208	69.6
Divorcee	12	4.0
Widow/widower	37	12.4
Educational status (n=299)		
Illiterate	79	26.4
Literate	220	73.6
Educational level (n=220)		
Primary	128	58.2
Secondary	70	31.8
Higher secondary	17	7.7
Bachelor and above	5	2.3
Employment status (n=299)		
Unemployed	232	77.6
Employed	67	22.4
Average Monthly Income (n=67)		
Not stated	3	4.5
<=20000	51	76.1
20000-50000	13	19.4
Risk Group (n=299)		
sex worker	18	6.0
Client of SW	35	11.7
MSM	27	9.0
Migrants	61	20.4
Spouse of migrant	120	40.1
Vertical transmission	30	10.0
Transgender	7	2.3
Unknown	1	0.3

In below table number 2, more than half of individuals (51.2%) were in Stage I of HIV infection, followed by 31.4% in Stage II, 15.1% in Stage III, and 2.3% have already reach the advanced Stage IV. All HIV positive individuals were receiving anti-retroviral therapy (ART). Viral load testing was performed in 94.3% of the individuals, while 5.7% had

not undergone viral load testing. Among those tested (n=282), almost all (98.2%) had suppressed viral load.

Table 2: Clinical profile of HIV positive individuals

Clinical profile	Frequency (n)	Percentage (%)
Stage of HIV (n=299)		
Stage I	153	51.2
Stage II	94	31.4
Stage III	45	15.1
Stage IV	7	2.3
Viral load done (n=299)		
No	17	5.7
yes	282	94.3
Viral load count (n=282)		
Suppressed	277	98.2
Unsuppressed	5	1.8

Pulmonary Tuberculosis among HIV infected individuals

The figure number 1 below shows, there were 22 individual with of PTB cases (7.4%) among HIV positive individuals.

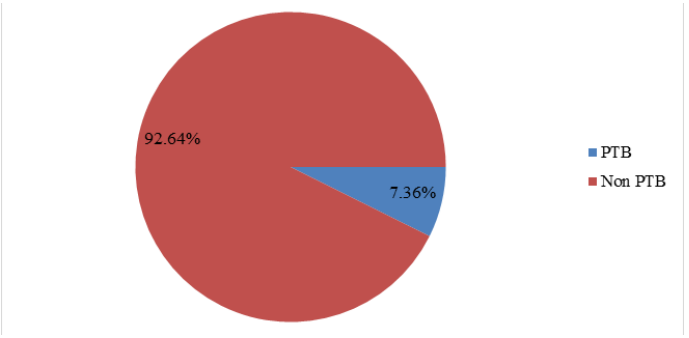


Figure 1: PTB among HIV positive individuals

Table number 3 below shows that, out of the 299 individuals, 47 had other associated diseases or comorbidities. Among them, the most common was infections as comorbidities (29.7%) followed by extra pulmonary tuberculosis (EPTB) and diarrhoea (17% each). Only two cases had Herpes Simplex as associated disease.

Table 3: Other associated diseases among HIV positive individuals

Other associated diseases (n=47)	Frequency (n)	Percentage (%)
EPTB	8	17.0
Diarrhoea	8	17.0
Anaemia	3	6.4
Herpes simplex	2	4.3
Infections as comorbidity	14	29.7
Dermatologic manifestation	6	12.8
Other disease associated with HIV	6	12.8

During chi square test, there were no significant associations found between PTB and socio-demographic characteristics of HIV positive individuals such as age, gender, ethnicity, marital status, educational status, employment status, and HIV risk group.

Table 4: Socio-demographic characteristics and PTB associated with HIV

Socio-demographic characteristics	PTB associated with HIV		p-value
	Yes.	No.	
Age			
0-9 years	0	6	0.341
10-19 years	1	17	
20-39 years	4	98	
40-59 years	15	145	
60 years and above	2	11	
Gender			
Male	18	127	0.005
Female	4	143	
Others	0	7	
Ethnicity			
Brahmin and Chhetri	6	103	0.779
Dalit	5	54	
Janajati	11	106	
Madhesi	0	1	
Muslim	0	2	
Others	0	11	
Marital Status			
Unmarried	3	39	0.706
Married	17	191	
Divorcee	1	11	
Widow/widower	1	36	
Educational status			
Illiterate	5	74	0.683
Literate	17	203	
Employment status			
Unemployed	15	217	0.271
Employed	7	60	
HIV Risk Group			
sex worker	1	17	0.000
Client of SW	2	33	
MSM	0	27	
Migrants	14	47	
Spouse of migrant	3	117	
Vertical transmission	2	28	
Transgender	0	7	
Unknown	1	0	
*: statistically significant at p<0.05			

Discussion

This study provides important insights into the socio-demographic and clinical characteristics of HIV-positive individuals attending the ART clinic at Rapti Academy of Health Sciences, with particular focus on pulmonary

tuberculosis (PTB) associated with HIV.

The socio-demographic profile shows a concentration of HIV positive individuals (53.5%) in the 40-59 age groups with a median age of 41 years, which shows significant similarity with the national trends where HIV disproportionately affects middle-aged adults.³ The gender distribution was nearly equal, with females (49.2%) slightly outnumbering males (48.5%), while transgender individuals constituted a small proportion of 2.3%, which contrasts with another study where males dominate HIV statistics,⁹ possibly due to higher migration and risk taking behaviours. Ethnically, Janajati (39.1%) and Brahmin/Chhetri (36.5%) groups were most affected, followed by Dalits (19.7%). This distribution may reflect regional population demographics rather than specific ethnic vulnerabilities. The high proportion of married individuals (69.6%), and the spouses of migrants (40.1%) being the largest risk group of HIV infected individuals suggests that heterosexual transmission within marital relationships remains a significant mode of HIV transmission in this region, which is consistent with finding from the study conducted in Nepal.⁹ In context of level of education, this study reveals that while literacy rates are relatively high (73.6%), educational level is predominantly at primary level (58.2%), with only 2.3% having bachelor's degrees. This educational pattern, combined with high unemployment (77.6%) and low income levels (76.1% earning ≤20,000 NPR), suggests that socioeconomic factors may play a role in HIV vulnerability, as revealed in other studies.^{6,9}

Clinically, most individuals (51.2%) were in Stage I of HIV infection, followed by Stage II (31.4%), indicating early detection and ART initiation, which shows similar context and good progress as per WHO recommendations for early treatment to suppress viral load.¹ The high percentage of viral suppression (98.2%) among tested patients demonstrates good ART adherence and program effectiveness.¹ The prevalence of PTB (7.36%) among those with HIV remains concerning, which aligns with findings from other studies.^{6,7}

Conclusion

This study was conducted to assess the Pulmonary Tuberculosis (PTB) and its associated factors among HIV positive individuals attending Antiretroviral Therapy Clinic of tertiary care hospital in Ghorahi, Dang. This study highlights the significant presence of PTB among HIV infected individual in Nepal. To address this, targeted interventions for high-risk populations and stronger integration of HIV and TB services are recommended. Being in a single ART centre and limited sample size, the study unable to establish statistically significant associations.

Further research with larger sample size in a multi-centre approach is recommended to better assess the socioeconomic and clinical determinants of PTB among HIV-positive individuals.

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