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AN OBSERVATIONAL STUDY ON PREVALENCE AND PRESCRIBING PATTERNS OF TUBERCULOSIS AMONG PEOPLE LIVING WITH HIV(PLHIV) ATTENDING A TERTIARY CARE

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ABSTRACT:

Background:
HIV and TB pose significant public health threats, but their combined impact has a much greater effect on epidemiological progression and the global health landscape. Having HIV is the primary factor that raises the risk of developing active TB. This not only makes individuals more prone to initial infection or reinfection but also increases the likelihood of TB reactivation in those with latent TB.This observational study was conducted with the objective to identify the prevalence and prescribing patterns of TB among PLHIV in a tertiary care teaching hospital.

Methods:
A prospective observational was conducted in 250 HIV patients on ART who attended an ART clinic over a 6-month period .

Result:
This study showed 250/100 (40%) prevalence of tuberculosis among people living with HIV, of which 68(68%) were males and 32(32%) were females. Low CD4 count (< 200/µl) had A strong statistical connection is observed between co-infection of HIV and TB compared to just having HIV infection.The treatment of HIV/TB Co-infection majority of the population received CAT 1 medications , for patients who were resistant to CAT 1 medications , Bedaquilline was recommended as CAT 2 medication.

Conclusion:
The increasing HIV prevalence is connected to more tuberculosis cases, demanding a reevaluation of control strategies. Integrated programs targeting behavior change and condom use can lower HIV transmission and vulnerability. Success hinges on public awareness and effective health education on tuberculosis and HIV spread.

Keywords : CD4+ cells, HIV, Tuberculosis, ART,ATT.

I.INTRODUCTION :

Tuberculosis (TB) is a bacterial infection caused by Mycobacterium tuberculosis, primarily affecting the lungs[1]. TB is a leading cause of death in people with HIV due to weakened immune systems. HIV/TB co-infection is dangerous; untreated latent TB is more likely to become active in those with HIV[2]. TB is considered as AIDS-defining condition, accelerating the progression of HIV to AIDS. TB and HIV are a deadly combination, with a significant risk of developing TB in people living with HIV [3]. Caring for both diseases poses public health challenges, and their synergy is a major concern. TB can occur early in HIV infection, and immune restoration from HIV treatment may lead to unique complications[4].

Human Immunodeficiency Virus (HIV) has long been recognized as a potent risk factor for tuberculosis (TB). In high HIV-prevalence countries, HIV infection increases the risk of TB by an astounding 20-fold when compared to HIV-seronegative individuals. Countries like the United States and the United Kingdom reported TB rates of just 4 per 100,000 and 12 per 100,000, in the year[5].Epidemiologically, TB in high-burden countries closely mirrors the HIV epidemic, with young women and men bearing the brunt of this dual crisis[6]. Multiple sociodemographic and clinical factors, including smoking, have been implicated in the increased TB risk[7].

TB can manifest in various ways, potentially affecting multiple organ systems beyond the lungs[8]. Some key signs and symptoms of TB in HIV-infected patients include:

Persistent cough: A cough that lasts for more than 2-3 weeks is a common symptom of TB. It may be accompanied by sputum production, which may be blood-stained, Weight loss, Night sweats,A low-grade fever, fatigue or a lack of energy,Chest pain, Shortness of breath, Difficulty breathing[9], Enlarged lymph nodes,TB can cause swollen lymph nodes in the neck, armpit, or groin[10]. Abdominal pain,HIV-infected patients with TB may experience abdominal pain or swelling[11].

In the context of HIV infection, the production of IFN-γ significantly decreases, coinciding with a reduction in CD4+ T-lymphocytes. This drastic decline in immune function substantially elevates the risk of reactivation or reinfection by M. tuberculosis[12]. Conversely, TB can also impact HIV progression, as inflammatory cytokines produced within TB granulomas, particularly TNFα, have been linked to increased HIV diversity, potentially hastening the course of severe immunosuppression[13].HIV infection disrupts the immune system and depletes CD4+ T-cells, impairing the body's ability to control TB infection[14]. The risk of active TB is highest among individuals with advanced HIV disease, defined as a CD4+ T-cell count below 200 cells/μL[15].HIV-positive individuals on antiretroviral therapy (ART) with high CD4 T-cell counts still face an elevated TB risk compared to uninfected individuals, indicating a multifactorial process contributing to this heightened risk[16].The increased incidence of extra-pulmonary TB in HIV-positive patients, While CD4 T-cell loss is a key factor in the increased TB risk with HIV disease progression[17].

Several factors have been identified as significant risk factors for the development of tuberculosis (TB) in individuals living with HIV:

Low CD4+ T-Lymphocyte Count,Lack of or Inadequate Antiretroviral Therapy (ART),Poor Nutrition and Underlying Medical Conditions, Close Contact with Individuals with Active TB, Substance Abuse , Advanced Age[18].To address these risks effectively, it is crucial to provide counseling and guidance to individuals with low adherence to treatment, elderly patients, those from rural areas, and those with concurrent opportunistic diseases. Special attention should be given to patients who smoke or consume alcohol, as these behaviors heighten TB risk[7]. Moreover, individuals with advanced HIV disease (WHO clinical stage IV), those who have not disclosed their HIV status, and those with ambulatory or bedridden functional statuses require increased vigilance and support[19].

The clinical complications associated with the co-infection of HIV and TB are multifaceted and pose significant challenges to patient management and overall health outcomes:Increased Risk of Developing Active TB Disease,Rapid Progression of TB Disease,Atypical and Extra-Pulmonary TB Presentation,High Mortality Rates: Increased Risk of Drug-Resistant TB, Adverse Reactions to TB Medications,Immune Reconstitution Inflammatory Syndrome (IRIS)[3].

Diagnosing tuberculosis (TB) in HIV-infected individuals presents unique challenges due to atypical clinical manifestations and altered immune responses resulting from HIV infection[20]. Various diagnostic techniques have been employed to address these challenges:

Chest X-ray: Radiographic imaging of the chest is a valuable tool for detecting TB-related abnormalities[21].
Sputum Smear Microscopy: Microscopic examination of sputum samples stained with carbol-fuchsin or auramine-based fluorescent stains is a common method for TB diagnosis, although sensitivity varies widely[22].
Tuberculin Skin Test: TB diagnosis may involve skin testing to assess immune response, but its accuracy can be influenced by HIV-related immune suppression[23].
Serological Diagnosis of TB: Serological tests detect antibodies or antigens associated with M. tuberculosis, although their sensitivity and reliability vary[24].
In the context of HIV/TB co-infection, a combination of these diagnostic tools and a careful evaluation of clinical and radiological findings are essential for accurate and timely diagnosis, allowing for prompt initiation of appropriate treatment[25].

The treatment of tuberculosis (TB) in HIV-infected individuals necessitates a comprehensive approach, considering potential drug interactions and overlapping toxicities between TB and HIV medications[26]. Here are key elements of treatment and prevention for TB among individuals living with HIV:
Antiretroviral Therapy (ART): ART is crucial for individuals with HIV and TB co-infection, as it enhances the immune system's ability to combat infections and reduces the risk of opportunistic illnesses[27].
TB Treatment: HIV-infected patients with TB should undergo standard TB treatment, which typically involves a combination of four drugs administered over six months. This regimen is designed to cure the TB infection[28].
Isoniazid Preventive Therapy (IPT): IPT is recommended for HIV-positive individuals who test negative for active TB but have been exposed to TB bacteria. IPT helps prevent the development of active TB disease[29].
For TB disease in adults co-infected with HIV, two treatment regimen options are available:

4-Month Rifapentine-Moxifloxacin TB Treatment Regimen: This regimen involves high-dose daily rifapentine (RPT) with moxifloxacin (MOX), isoniazid (INH), and pyrazinamide (PZA)[%]. It consists of an intensive phase lasting 8 weeks.', followed by a continuation phase of 9 weeks (total treatment duration of 17 weeks)[30]. This regimen is suitable for individuals with HIV with CD4 counts at or above 100 cells/µL who are taking efavirenz as part of their ART regimen.

6- or 9-Month RIPE TB Treatment Regimen: The RIPE regimen includes rifampicin (RIF), isoniazid (INH), pyrazinamide (PZA), and ethambutol (EMB). It begins with an intensive phase comprising INH, a rifamycin, PZA, and EMB for the first 2 months, followed by a continuation phase of INH and a rifamycin for the last 4 months[31]. For HIV-infected patients who do not initiate ART during TB treatment, extending treatment to 9 months (prolonging the continuation phase to 7 months) is recommended. This is especially relevant for patients with a delayed response to therapy[32].

Additional considerations for HIV/TB co-infection treatment include the need to initiate ART early during TB treatment, infection control measures to prevent TB transmission, patient education, and adherence counseling to ensure that individuals complete their treatment as prescribed[33].

II.RESULTS:

Characteristics	category	tb status	percentage
age	17-40	49	49
	41-80	51	51
gender	male	68	68
	female	32	32
marital status	unmarried	25	25
	married	30	30
	divorced	25	25
	widowed	10	10
	Separated	10	10
residence area	urban	17	17
	Rural	83	83
level of education	illiterate	62	62
	primary	18	18
	secondary	12	12
	tertiary	8	8

Table.1

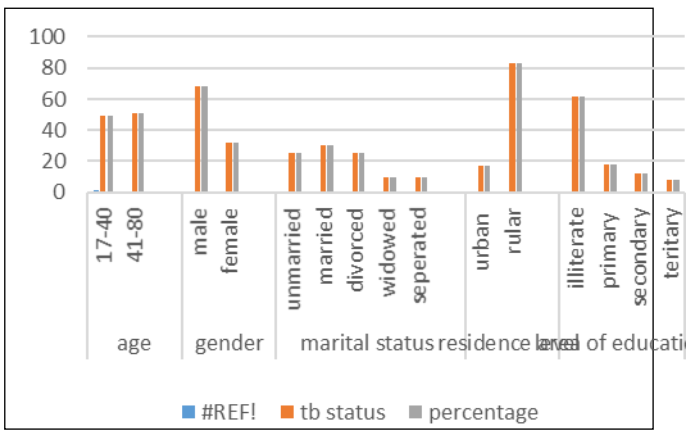

Chart.1

In this study, participants spanned from 17 to 80 years old, with the highest proportion falling within the 41-50 age bracket (35%), followed closely by the 31-40 age group (28%). Regarding the distribution of HIV/TB co-infection based on gender, 68% were male, while 32% were female, suggesting a potentially higher prevalence of HIV/TB co-infection among males.Rural residents (83%) were more prone to HIV/TB co-infection compared to their urban counterparts (17%). Additionally, there was a notable distinction in disease management between literate (38%) and illiterate (62%) patients, with the former group displaying better adherence to prescribed medication, potentially resulting in better disease management.

characteristics	category	Tb_Status	percentage
occupation	unemployed	40	40
	employed	35	35
	others	25	25
functional status	ambulatory	16	16
	bedridden	18	18
	working	37	37
	others	29	29
opportunistic infections	no	55	55
	yes	45	45
BMI	underweight	45	45
	normal	40	40
	overweight	15	15
social support	no	55	55
	yes	45	45
medication adherence status	no	35	35
	yes	65	65

Table.2

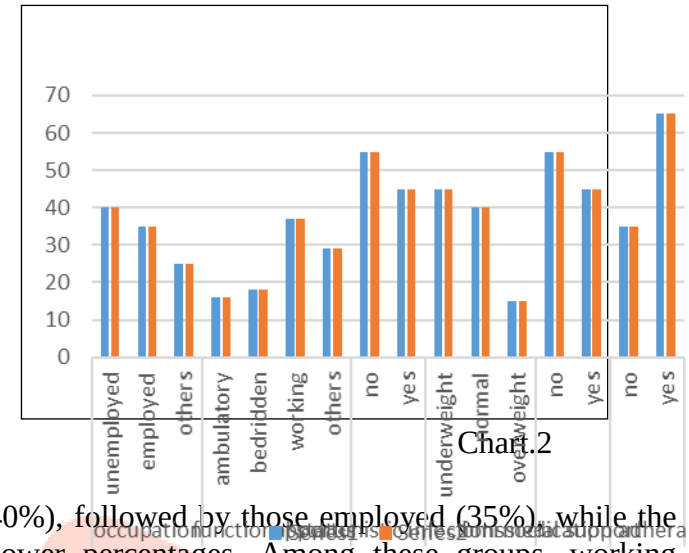

Chart.2

The study revealed that the majority were unemployed (40%), followed by those employed (35%), while the remaining fell into other categories (25%), albeit in lower percentages. Among these groups, working individuals (37%) showed a higher likelihood of co-infection compared to those who were ambulatory (16%), bedridden (18%), or in other categories (29%).

Characteristics	category	tb status	mean cd 4 count	percentage
co infection status				
HIV/tb status	stage 1	18	408.02	18
	stage 2	15	356.22	15
	stage 3	37	325.25	37
	stage 4	30	315.15	30

Table.3

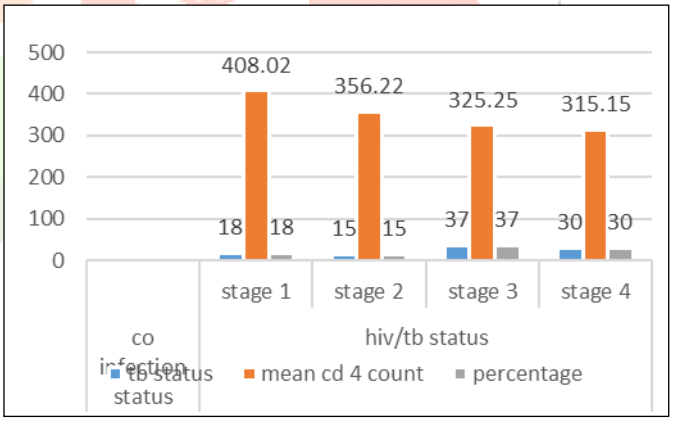

Chart.3

Co-infection with TB were lower for patients in HIV stages 1 and 2 compared to stages 3 and 4, suggesting a negative correlation between these factors.

DRUGS	POPULATION	PERCENTAGE
lamivudine 150mg+zidovudine300mg	100	40
dolutegravir 50mg+lamivudine300mg+tenofovir300 mg	15	6
atazonavir300mg+rotanavir100mg	20	8
dolutegravir 50mg	0	0
lamivudine 150mg+nevirapine 200mg+zidovudine 300mg	105	42
Co-Trimaxazole (trimethoprim100mg+sulphamethozole 200mg	5	2
abacavir sulphate 80mg+lamivudine30mg	5	2
lopinavir 40mg+ritonavir 10mg	0	0

Table.4

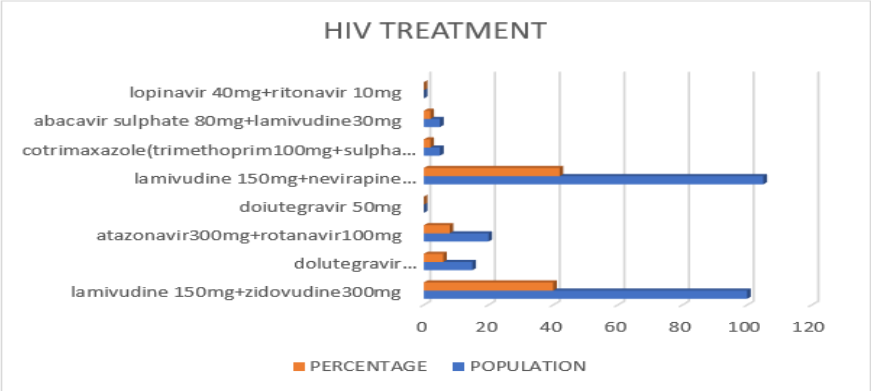

Chart.4

The most prescribed drugs included Lamivudine 150mg, Nevirapine 200mg, and Zidovudine 300mg. For HIV/TB co-infection, the majority received CAT 1 medications, while those resistant to CAT 1 drugs were recommended Bedaquilline as CAT 2 medication.

III.DISCUSSION:

In this research, among 250 patients diagnosed with HIV who sought treatment at the ART clinic, 100 individuals (40%) had concurrent HIV/TB co-infection, while the remaining 150 patients (60%) were solely diagnosed with HIV. Similarly, another study conducted in a South Indian tertiary care hospital by Padyana et al. observed that out of 200 HIV-positive patients, 27% had HIV/TB co-infection, leaving 73% with HIV alone. Additionally, a study conducted by Kebede and Wabe in South West Ethiopia, which focused on 296 patients undergoing concomitant tuberculosis and antiretroviral therapy at a hospital treatment center, found that only 8.1% of them were co-infected with both HIV and TB. The participants ranged in age from 17 to 80 years, with the largest portion falling within the 41-50 age group (35%), followed by those aged 31-40 (28%). Regarding gender distribution, 68% of patients with HIV/TB co-infection were male, while 32% were female, suggesting a higher occurrence among males.

Education was found to be influential in disease progression. A higher percentage of literate patients (38%) showed better adherence to prescribed medication, potentially leading to better disease management compared to illiterate patients (62%). The latter group, being more prevalent among those developing secondary infections like TB.

Patients from rural areas (83%) were more prone to HIV/TB co-infection compared to urban residents (17%). Moreover, HIV patients receiving social support from their communities were less likely to develop HIV/TB co-infection, possibly due to better adherence to medication and food requirements.Results indicated that patients in earlier HIV stages (first and second) tended to have higher expected CD4 cell counts compared to those in later stages (third and fourth). However, the odds of co-infection with TB were lower for patients in HIV stages 1 and 2 compared to stages 3 and 4, suggesting a negative correlation between these factors.Low CD4 cell counts in HIV-infected individuals indicate compromised immunity, making them susceptible to fresh TB infections or reactivation of latent ones, leading to a rapid decline in their clinical condition.Regarding medication, for HIV treatment, the most prescribed drugs included Lamivudine 150mg, Nevirapine 200mg, and Zidovudine 300mg. For HIV/TB co-infection, the majority received CAT 1 medications, while those resistant to CAT 1 drugs were recommended Bedaquilline as CAT 2 medication.

IV.CONCLUSION:

The increasing occurrence of HIV has been associated with a surge in tuberculosis incidences, prompting a reevaluation of strategies to manage both diseases. Initiating initiatives that blend behavior modification approaches and promote the adoption of condoms can effectively lower HIV transmission rates and mitigate the susceptibility of individuals exposed to HIV. Essential to the effectiveness of these initiatives is the establishment of widespread public consciousness and the delivery of impactful health education regarding the transmission of tuberculosis and HIV.

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