

PREVALENCE OF HIV-TB CO-INFECTION AND RELATIONSHIP BETWEEN TUBERCULOSIS AND CD4 COUNT IN HIV PATIENTS DURING THE COURSE OF THE TREATMENT IN PATIENTS ATTENDING ART CENTER AT TERTIARY CARE HOSPITAL**Dr. Divya Undrakonda¹, Dr. N. Sridevi*², Dr. G. Jyothi Lakshmi³, Dr. P. Shashikala Reddy⁴**¹Post Graduate, Department of Microbiology, Osmania Medical College, Koti, India.²Assistant Professor, Department of Microbiology, Osmania Medical College, Koti, India.³Professor and HOD, Department of Microbiology, Osmania Medical College, Koti, India.⁴Principal and Professor, Department of Microbiology, Osmania Medical College, Koti, India.***Corresponding Author: Dr. N. Sridevi**

Assistant Professor, Department of Microbiology, Osmania Medical College, Koti, India.

Article Received on 08/06/2021

Article Revised on 29/06/2021

Article Accepted on 19/07/2021

ABSTRACT

Background-HIV-TB co-infection has become a major public health problem worldwide. When HIV and TB co infection occurs, they form a deadly combination with each accelerating the progression of the other, resulting in increased morbidity and mortality. Low CD4 count is associated with low immunity and higher risk of tuberculosis. In this study, We aimed to determine the prevalence of tuberculosis-HIV coinfection, and the relationship between tuberculosis and CD4 count in HIV patients, we examined trends in CD4 count over follow up period, ART usage and treatment outcomes among HIV-positive TB patients attending ART center at tertiary care hospital in the year 2020. **Materials and methods-**A prospective study is conducted in patients attending ART center at Osmania General Hospital(tertiary care hospital) during 2019 and 2020. Collected data of all the patients with HIV diagnosed with Tuberculosis from the ART Centre. Data about demographic details including age, sex, Education, Occupation ,details of diagnosis of TB, CD4 count at the diagnosis of TB, details of ART therapy and ATT therapy and outcomes of treatment. **Results-** Prevalence of HIV-TB coinfection in the year 2019 and 2020 are 7.3%. In both years HIV-TB coinfection is more prevalent in males (72%) compared to females (28%). Prevalence of pulmonary Tuberculosis in 2020 is 47% which is less than the prevalence of pulmonary TB in 2019(58%). 70% of patients developed Tuberculosis with CD4 count <200/ μ l, 21% of patients are with 200-400/ μ l and 9% of patients are with >400/ μ l during 2019 whereas in year 2020, 64% of patients developed Tuberculosis with CD4 count <200/ μ l, 22% of patients are with 200-400/ μ l and 14% of patients are with >400/ μ l 97.5% of patients are on TLE regimen and 2.5% of patient with CD4 count 715 μ L are on ZL+E regimen. **Conclusion-**Most of the patients (90%) are illiterates. In a country like India where both these diseases are rampant, better information, education, understanding and awareness for prevention, early diagnosis, and treatment of these two notorious infectious diseases is mandatory.

KEYWORD: HIV-TB Co infection, CD4 Count, ART.**INTRODUCTION**

HIV-TB co-infection has become a major public health problem worldwide particularly in low and middle-income countries.^[1] India contributes about one-fourth of the global TB burden with the highest burden of both TB and MDR TB and the country is second only to South Africa for the highest estimated HIV-TB cases.^[2,3] HIV infection being an immunosuppressive disease predisposes patient with latent tuberculosis infection to develop tuberculosis disease.^[4] They form a deadly combination with each accelerating the progression of the other, resulting in increased morbidity and mortality.

Clinical presentation and clinical forms of TB in HIV patients partly depends on CD4 counts. So, it is important to study impact of CD4 counts and development of tuberculosis in HIV.^[7] Low CD4 count is associated with low immunity and higher risk of tuberculosis. In tuberculosis-HIV coinfection, the clinical features of tuberculosis are altered due to immunosuppression, so most of the patients does not show sensitivity to 4S complex. Public health interventions aimed at reducing TB incidence rates have included the WHO three I's strategy of intensified case-finding, Isoniazid preventive therapy and infection control as well as wide-scale antiretroviral therapy (ART) for HIV-positive patients

There was a need to study the profile of patients who come to anti-retroviral therapy (ART) centers and link their clinical and socio-demographic variables in the prevention of this disease. In this study, We aimed to determine the prevalence of tuberculosis-HIV coinfection, and the relationship between tuberculosis and CD4 count in HIV patients, we examined trends in CD4 count over follow up period, ART usage and treatment outcomes among HIV-positive TB. In this study we examined the trends in number of TB cases before and during COVID 19 times

MATERIALS AND METHODS

A prospective study is conducted in patients attending ART center at Osmania General Hospital (tertiary care hospital) during 2019 and 2020. Collected data of all the patients with HIV diagnosed with Tuberculosis from the ART Centre. Data about demographic details including age, sex, Education, Occupation ,details of diagnosis of TB, CD4 count at the diagnosis of TB, details of ART therapy and ATT therapy and outcomes of treatment.

RESULTS

Our study during 2019 and 2020 HIV cases are 1598, total Tuberculosis cases are 1088. Hiv-Tb coinfection in 2019 and 2020 are 122 (Illustrated in figure 2). Prevalence of HIV-TB coinfection are

7.3%. CD4 count <200 /µl in 2 years study are 66.7%. In both years HIV-TB coinfection is more prevalent in males (72%) compared to females (28%). In 2019 coinfection is more common in 25-35 years (43%) age group but in 2020 it is more in 36-45 years (43%) age group. Most of the patients are illiterates (48%) followed by primary education in 45% and only 2% of patients are undergraduates and above. After 6 months of ART there is no much improvement in CD4 count in both the years (12). 95% patients are on TLE regimen, only 5% are on ZL+E regimen (Illustrated in table.1). Almost all the known HIV cases are initiated on the IPT treatment. In spite of this those patients developed TB coinfection. We observed that these patients are not 100% compliant to treatment. All are Heterosexuals.

TB is diagnosed in these patients by CBNAAT. Prevalence of pulmonary Tuberculosis in 2020 is 47% which is less than the prevalence of pulmonary TB in 2019 (58%). 85% of patients have 4S complex (current cough, fever, weight loss, and night sweats). 12.5% of them are resistant to RIFAMPICIN. And referred to higher centers. Patients who are not resistance to rifampicin started on HRZE regimen and regular follow up is planned and to maintain that patients are referred to near TB clinics to maintain regular follow up.

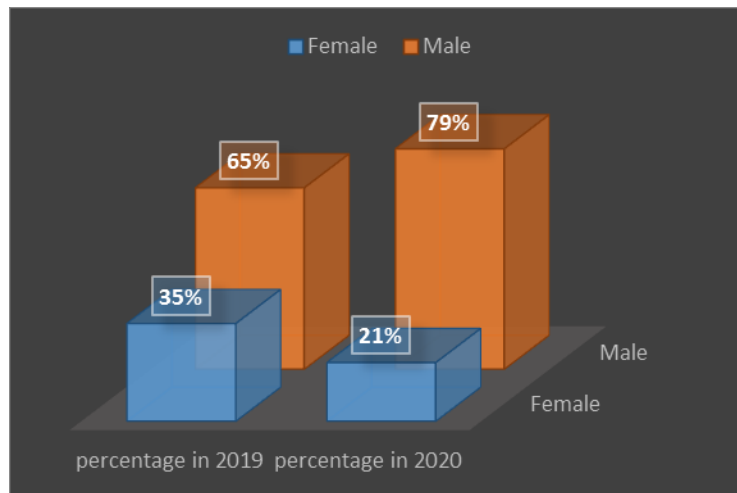


Fig. 1: Sexwise distribution of HIV-TB Co-infection.

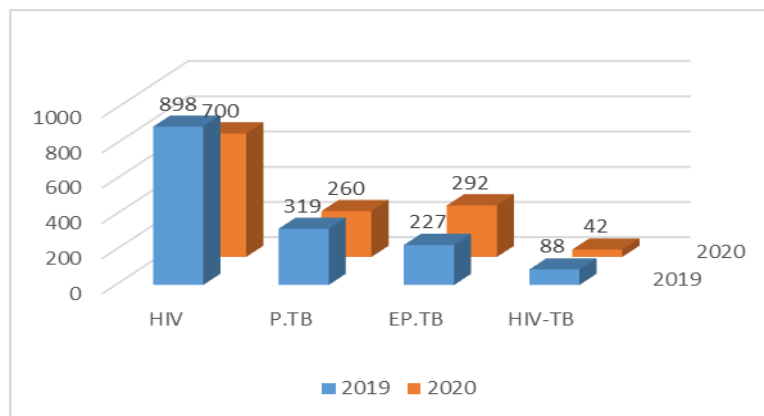


Fig. 2: Number of HIV, TB, HIV-TB cases during 2019 and 2020

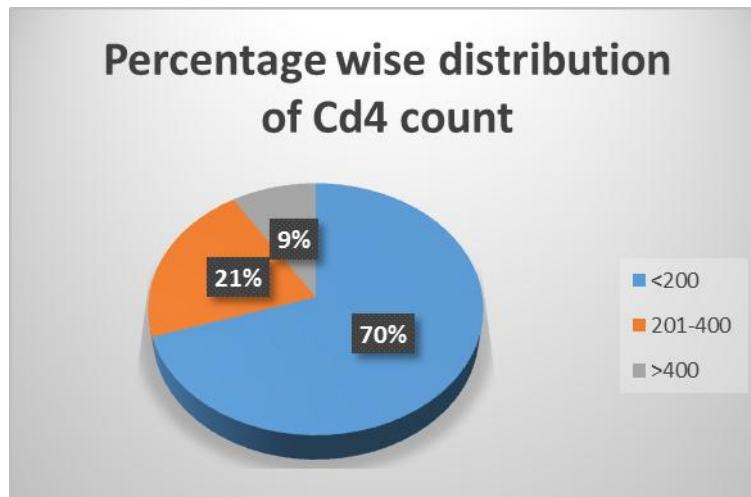


Fig-3 Percentage wise distribution of CD4 count in HIV-TB Patients

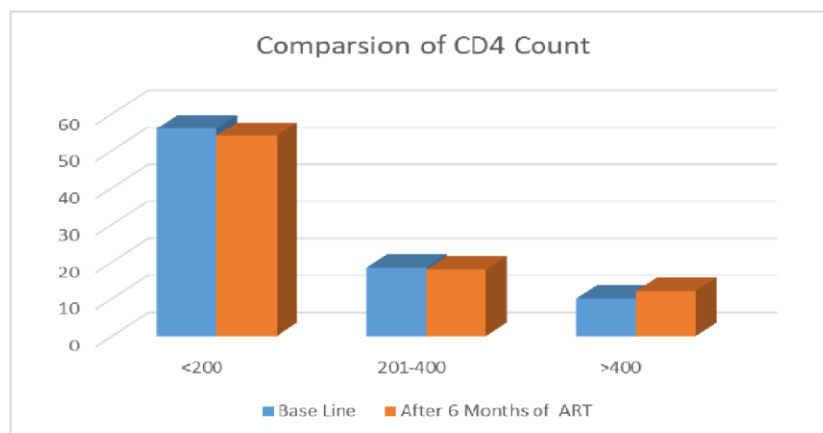


Fig-4 Comparison of CD4 count after 6months of ART treatment

Table 1: Demographic distribution, CD4 count and Type of Tuberculosis.

GROUP	Percentage (%) in 2019	Percentage (%) in 2020
AGE		
25-35 years	43 %	27 %
36-45 years	36 %	43 %
46-55years	13 %	24 %
56-65years	8 %	6 %
SEX		
Female	35%	21%
Male	65%	79%
EDUCATION		
Illiterate	48%	48%
Primary School	42%	45%
College and above	10%	7%
CD4 COUNT		
<200	70%	64%
201-400	21%	22%
>400	9%	14%
TYPE OF TB		
Pulmonary TB	58%	47%
Extra Pulmonary	42%	53%
REGIMEN		
TLE regimen	98%	97%
ZL+E regimen	2%	3%

DISCUSSION

Tuberculosis remains the most common cause of death in patients with HIV infection globally. Patients with HIV infection have 10% per year risk of acquiring TB in contrast, to patients with Non-HIV infection have 10%

risk in life time.^[13] The results showed that of the 1568 subjects included in the study, 122 of the subjects had Tuberculosis-HIV coinfection. This gives an observed prevalence of 7.5% of tuberculosis- HIV coinfection in the study group.

Table-2: Prevalence of HIV-TB Co-infections in other studies.

STUDY	PLACE AND YEAR OF STUDY	PREVALENCE OF HIV-TB
Present study	Telangana in 2019 and 2020	7.3%
Kodandarao Kuna <i>et.al</i> (15)	Andrapradesh in 2018	12.76%
Laxmi Gautam <i>et.al</i>	Maharashtra in 2014	21.56%
Jutang Babat Ain Tiewsoh <i>et.al</i>	Karnataka in 2017	50%
Nwabuko C.O <i>et.al</i>	Nigeria in 2008	5.9%
Richard Kaplan <i>et.al</i>	Cape town from 2008-2013	49%

Males are affected more than females which is similar to Tiewsoh JB *et.al*, Ghiya R *et.al*, Jindal S *et.al*.^[3,6,7,8] In this study that patients with HIV- TB co-infection with low CD4 count are at a higher risk of developing Tuberculosis. Low CD4 counts can be used as a marker for suspicion of severe forms of TB. CD4 cells are the T helper lymphocytes involved in cell mediated immunity. These help to coordinate the immune response by stimulating other immune cells such as macrophages, B lymphocytes and CD8 T lymphocytes which are mainly involved in fighting off infections.^[5] In this study HIV – TB coinfection is more common with CD4 count <200 / μ l which is in accordance with Satyanarayan TB *et.al* and Sharma SK *et.al*.^[5,8] We found that majority were diagnosed with PTB which is accordance with Kamath *et al*.^[9] who had reported PTB (59%) to be the most common presentation followed by EPTB (38%).

In this study, during the year 2020 the extra pulmonary TB are majority (53%). Out of which Abdominal tuberculosis accounts for 40% followed by lymph node tuberculosis with 30%. TB lymphadenitis typically involves the lymph nodes in the posterior cervical and supraclavicular chains. Infection in these areas is thought to be due to contiguous spread from intrathoracic lymphatics or from infection in the tonsils and adenoids HIV infection decreases an individual's immunity, and patients with HIV infection reportedly experience extra pulmonary tuberculosis as commonly as they experience pulmonary tuberculosis.^[16]

TB has been one of the most discussed topics during the COVID pandemic because of the "protection" provided by the TB vaccine (BCG). There are concerning reports suggesting that COVID-19 may slow down the recent gains in TB control.^[14] In our study we observed that pulmonary TB cases are decreased in 2020. This might be firstly due to the diagnosis of new TB cases has seen a dramatic drop since the lockdown according to the Central TB Nikshay portal of Government of India (10,11), Closure of out-patient departments (OPD) at various hospitals, poor access to treatment, refusal by government and private hospitals, difficulty in reaching Direct Observed Therapy program (DOTS) centers by

patient and medical staff due to limited transport have been quoted as reasons for this situation.

Secondly, using a mask is an infection control measure which, COVID has ensured that the common man in India now knows about N95 masks and PPEs. COVID has heightened awareness and sensitized people about the need for infection control which will definitely benefit the TB control program. 'Compared to the novel corona virus, the TB mycobacterium is big. "The TB bacillus spreads through droplet released when a person coughs or sneezes. The microbe travels at the speed of Ferrari across the room, but even handkerchief (as against face masks that have tinier pores and have two-to three-ply material) can stop it instantly,"

In this study pulmonary TB (47%) cases during 2020 are less compared to pulmonary TB during 2019 (53%). Adewole, O points out the significant impact of COVID-19 pandemic on TB treatment and has highlighted a marked reduction in the number of presumptive and confirmed TB case detection in 2020 during the current pandemic compared to the same time in 2019 in Nigeria.^[11]

CONCLUSION

In a country like India where both HIV-TB diseases are rampant, better information, education, understanding and awareness for prevention, early diagnosis, and treatment of these two notorious infectious diseases is mandatory. During the pandemic TB patients, though, have suffered due to lack of medicines and the difficulty in traveling to treatment centres during the lock down, TB detection rates dropped in the early phase of COVID in March, there are fewer new cases because of the lower risk of transmission. "People are staying home or moving out with masks, resulting in a lower risk of transmission.

The World Health Organization has set a deadline of 2030 to eliminate TB, but the Indian government announced an earlier deadline of 2025. As India is home to 25% of all tuberculosis patients in the world, public health experts felt the 2025 deadline was ambitious. "But

if we continue using mask and remember to follow cough etiquette, the deadline no longer seems achievable.

REFERENCES

- Gautam L, Deshpande JD, Somasundaram KV. Prevalence of HIV-TB co-infection, clinical profile and CD4 count of HIV patients attending ART centre of Ahmednagar, Maharashtra. *Int J Med Sci Public Health*, 2014; 3: 1105-1109.
- TB FACTS.ORG. TB in India – Elimination, Private care, TB burden, NSPs. Available from: <https://www.tbfacts.org/tb-india/>. [Last accessed on Jul 19], 2019.
- Tiewsoh JB, Antony B, Bloor R. HIV-TB co-infection with clinical presentation, diagnosis, treatment, outcome and its relation to CD4 count, a cross-sectional study in a tertiary care hospital in coastal Karnataka. *J Family Med Prim Care*, 2020; 9: 1160-5.
- Nwabuko, Ogbonna, & Oa, Ejele & Chuku, Abali & Nnoli, Martin & Chukwuonye, Innocent. Prevalence of Tuberculosis-HIV Coinfection and Relationship between Tuberculosis and CD4/ESR in HIV Patients in Niger Delta Region of Nigeria. *IOSR Journal of Dental and Medical Sciences*, 2012; 2: 10.9790/0853-0240104.
- Satyanarayan TB, Manjunath MP, Ranganath M, Mahendra M. Impact of CD4 count in the development of mycobacterium tuberculosis in patients with HIV infection in a tertiary care centre. *Int J Adv Med*, 2018; 5: 340-2.
- Ghiya R, Naik E, Casanas B, Izurieta R, Marfatia Y. Clinicoepidemiological profile of HIV/TB coinfecting patients in Vadodara, Gujarat. *Indian J Sex Transm Dis.*, 2009; 30: 10–5.
- Jindal S, Damor PH, Patel R. A study of tuberculosis and HIV coinfection and its correlation with CD4 count. *Natl J Community Med.*, 2018; 9: 110–3.
- Sharma SK, Soneja M, Prasad KT, Ranjan S. Clinical profile & predictors of poor outcome of adult HIV-tuberculosis patients in a tertiary care centre in north India. *Indian J Med Res.*, 2014; 139: 154–60.
- Kamath R, Sharma V, Pattanshetty S, Hegde MB, Chandrasekaran V. HIV-TB coinfection: Clinico-epidemiological determinants at an antiretroviral therapy center in Southern India. *Lung India*, 2013 Oct; 30(4): 302-6. doi: 10.4103/0970-2113.120605. PMID: 24339487; PMCID: PMC3841686.
- Government of India. Central Tuberculosis Division. India TB report Available from: <https://tbcindia.gov.in/>. [Accessed 10 July 2020]. Accessed, 2020.
- Jain VK, Iyengar KP, Samy DA, Vaishya R. Tuberculosis in the era of COVID-19 in India. *Diabetes Metab Syndr*, 2020 Sep-Oct; 14(5): 1439-1443. doi: 10.1016/j.dsx.2020.07.034. Epub 2020 Jul 29. PMID: 32755848; PMCID: PMC7387287.
- Kaplan R, Hermans S, Caldwell J, Jennings K, Bekker LG, Wood R. HIV and TB co-infection in the ART era: CD4 count distributions and TB case fatality in Cape Town. *BMC Infect Dis.*, 2018 Jul 31; 18(1): 356. doi: 10.1186/s12879-018-3256-9. PMID: 30064368; PMCID: PMC6069570.
- WHO. IRIS: Global tuberculosis control: WHO report, 2011. Available at <http://apps.who.int/iris/handle/10665/44728>. Accessed on Feb 15, 2018.
- Adewole O. Impact of COVID-19 on TB Care: Experiences of a Treatment Centre in Nigeria. Available from: <https://www.theunion.org/news-centre/news/impact-of-covid-19-on-tb-care-experiences-of-a-treatment-centre-innigeria>. [Accessed 10 July]. Accessed, 2020.
- Rao, Dr. Epidemiology of Tb-HIV Co-Infection among the Population of Visakhapatnam District in Andhra Pradesh- A Retrospective Observational Study. *Journal of Medical Science And clinical Research*. 08. 10.18535/jmscr/v8i10.13, 2020.
- Carpenter CCJ, Lederman MM, Salata RA. Infections of the lower respiratory tract. In: Andreoli TE, Bennett JC, Carpenter CCJ, Plum F, eds. *Cecil essentials of medicine*. 4th ed. Philadelphia: W. B. Saunders, 1997; 699–707.