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Clinico-Epidemiological Study of HIV-TB Co-Infection In Southern India

Sri Lakshmi Avutu[1]*, Shaheem Sulthana Mohammad[2], Jhansi Lakshmi Marreddy[3]
1.Department of Pharmacology, ASN Pharmacy College, Burripalem Road, Tenali-522201, Andhra Pradesh, India.
2.Department of Pharmaceutical Analysis & Quality Assurance, ASN Pharmacy College, Burripalem Road, Tenali-522201, Andhra Pradesh, India.
3.Department of Pharmaceutical Analysis, ASN Pharmacy College, Burripalem Road, Tenali-522201, Andhra Pradesh, India.

ABSTRACT

This study was aimed at identifying the CLINICO-EPIDEMOLOGICAL study of underlying HIV–TB coinfection. A retrospective review of patient records was done from the antiretroviral therapy center (ART) at a government hospital in southern India between June 2018 and April 2019. Secondary data of 10155 patients on ART as well as pre-ART were collected between January 2009 and December 2018 and were analyzed. Wilcoxon signed rank tests were used with SPSS version 15.0 The prevalence of HIV-TB coinfection 0.13% among the sample was taken. HIV–TB coinfection was increased in trend of population from 1.41% in 2009 to 45.3% in 2018 until when the data were included in this study. The proportion of HIV infection among those registering at this particular ART center decreased from 18.7% in 2009 to 6.44% in 2018. The prevalence of HIV infection and HIV-TB coinfection higher in males (3.73% & 33.3%) than females (3.20% & 12.05%) respectively among those registering at this particular ART center. The fatality rate of HIV infection was decreased from 23.4% in 2009 to 2.33% in 2018. The CD_4 count (200 cells/µl) lower in co-infected patients than HIV infected patients. The increasing trend of HIV–TB cases observed in this population from 1.41% in 2009 to 45.3% in December 2018. Creating grass root level awareness coupled with aggressive case finding in suspected high-risk population may be key in preventing and early detection of the dual infections.

Keywords: ART, CD4, prevalence, HIV–TB, coinfection.

*Corresponding Author Email: srilakshmiavutu29@gmail.com
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INTRODUCTION

HIV/AIDS and tuberculosis (TB) can individually be the major causes for concern as stand-alone public health threats, the combination of the two has proven to have a far greater impact on the epidemiologic progression and consequently on the impact it has on the global health scene. The dual infection has been termed "accursed duet"[1].

Research shows that of the opportunistic infections affecting HIV-infected patients, TB is found to be the most common with high risk for mortality[2, 3] and the risk of coinfection with TB is about 20-37 times higher among those infected with HIV according to WHO. A 2010 report by the WHO reported that 360,000 people had died with active TB and HIV infection, indicating an increase from 2010 to 2011.[7]

India has a very high burden of TB according to the WHO, and infection with *M. tuberculosis* ranks foremost among opportunistic infections causing comorbidity with HIV infection.[1]

As evidenced by several research reports globally, susceptibility to TB increases manifold with concurrent HIV infection. It is fast becoming evident that the TB population should be seen as an important cohort to screen for HIV.[9, 10] it has been documented that coinfection with HIV and *Mycobacterium tuberculosis* has a synergistic effect on each other, and in later stages of HIV infection, TB may present as extra pulmonary disease.[11]

Research has demonstrated that in resource-constrained settings up to 50% of patients with HIV without treatment but with concurrent TB would die prior to completion of the 6 to 8 months of treatment for TB, some as early as within the first 2 to 3 months.

With the emergence of TB as a lethal counterpart in the epidemiology of HIV, there is an urgent need to understand possible multifactorial associations to this partnership. This study attempts to do just that in describing the underlying correlates to HIV-TB coinfection.

This study reviews the current epidemiology of HIV infection–associated TB and the global progress in the implementation of these interventions.

MATERIALS AND METHOD

A retrospective review of standardized patient records was conducted at the antiretroviral therapy center (ART) Center of the Tenali Government Hospital in southern India between june2018 and April 2019.Ethical clearance was duly obtained from the institute ethical committee for conducting the study. HIV–TB co-infected patients accessing services at the ART center including those on ART and pre-ART enrolled between January 2009 and December 2018 were included in the study.

The study aims at describing the sociodemographic and clinical profiles of HIV–TB coinfected patients.

Between January 2009 and December 2018, 10155 patients infected with HIV were registered at this ART center located at a Tenali government hospital in Southern India. The Voluntary Counselling and Testing Center (VCTC) now designated as the Integrated Counselling and Testing Centre emerged as the key entry point for patients to this ART center.

RESULTS AND DISCUSSION

This study aimed at drawing out the profile of individuals with dual infection of HIV–TB. A total 10655 HIV/AIDS patients reported in the ART center, Guntur district, between June 2018 and April 2019. Of them, 141 were reported HIV–TB coinfection, which indicates 0.13% prevalence in this sample. From this study, the profile emerged of higher prevalence of coinfection among males in the sexually active age groups with little or no education, being married, working as labours, living in the rural setting and belonging to the lower socioeconomic rung. These socio-demographic findings are comparable to other studies conducted in India. The results of this study also showed that the heterosexual route of transmission was the most common indicating the need for intervention targeted at behavior modification[21]. Data accrued from this study pointed to the fact that VCTC, now designated as ICTC implemented by NACO emerged as an effective entry point for almost high (45.3%),2018 of those sampled to access ART. The mean CD4 count in this population was observed in this study comparable to a study conducted in Northern India[22]. Coinfection is associated with lower CD4 counts than those with HIV alone, which could translate into increased morbidity and progression of HIV to AIDS. Several other research studies have pointed to the fact that CD4 counts are lower among confected patients as compared to HIV infected alone and severe immune suppression is seen in those with CD4 count below 200 cells/μL[22,23]. TB therapy is seen to have a positive influence on CD4 counts[24],and the DOTS initiative has been demonstrated to prevent and even reverse the emergence of MDR-TB[25].

It is worth noting that an increasing trend in the proportion of HIV–TB cases in this population from 1.41% in 2009 to 45.3% in December 2018 until when data were included in this study. In light of a WHO report in 2009 that only about 4% of individuals in India with TB get tested for concurrent HIV infection, this could be deciphered to mean that the case finding has improved since this last report. The Centers for Disease Control (CDC) has stated that TB is one of the few HIV related opportunistic infections that is both preventable as well as curable[26]. As observed in this study, treatment of HIV and TB comorbid conditions together had a favorable outcome with

reduced risk of death comparable to a study by Cain *et al*[27].Nevertheless, this rising trend needs to be further investigated to identify other underlying factors.

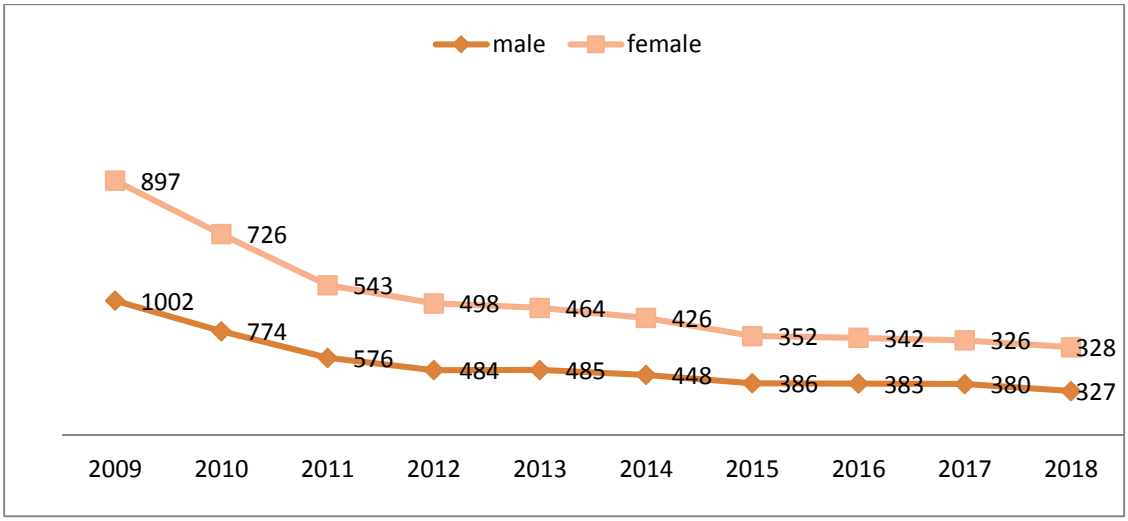

Figure 1: Prevalence of HIV infection in male and female population

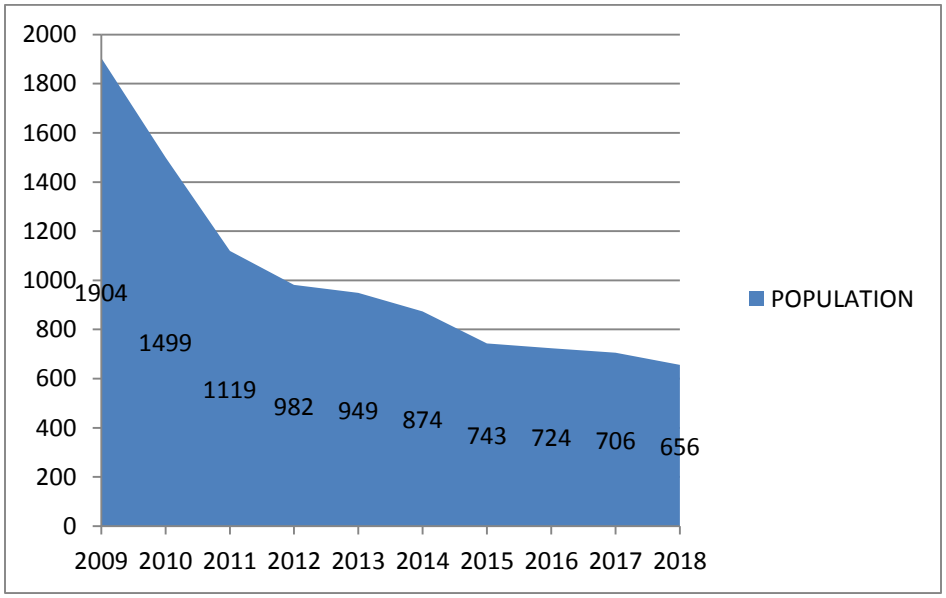

Figure 2: Prevalence of HIV Population

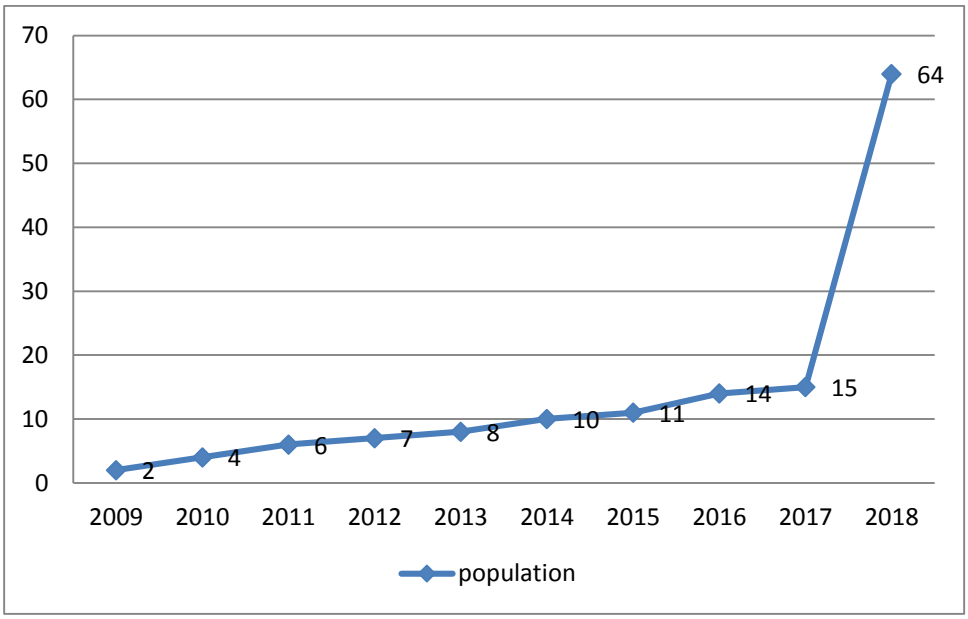

Figure 3: Prevalence of HIV-TB co-infection in population

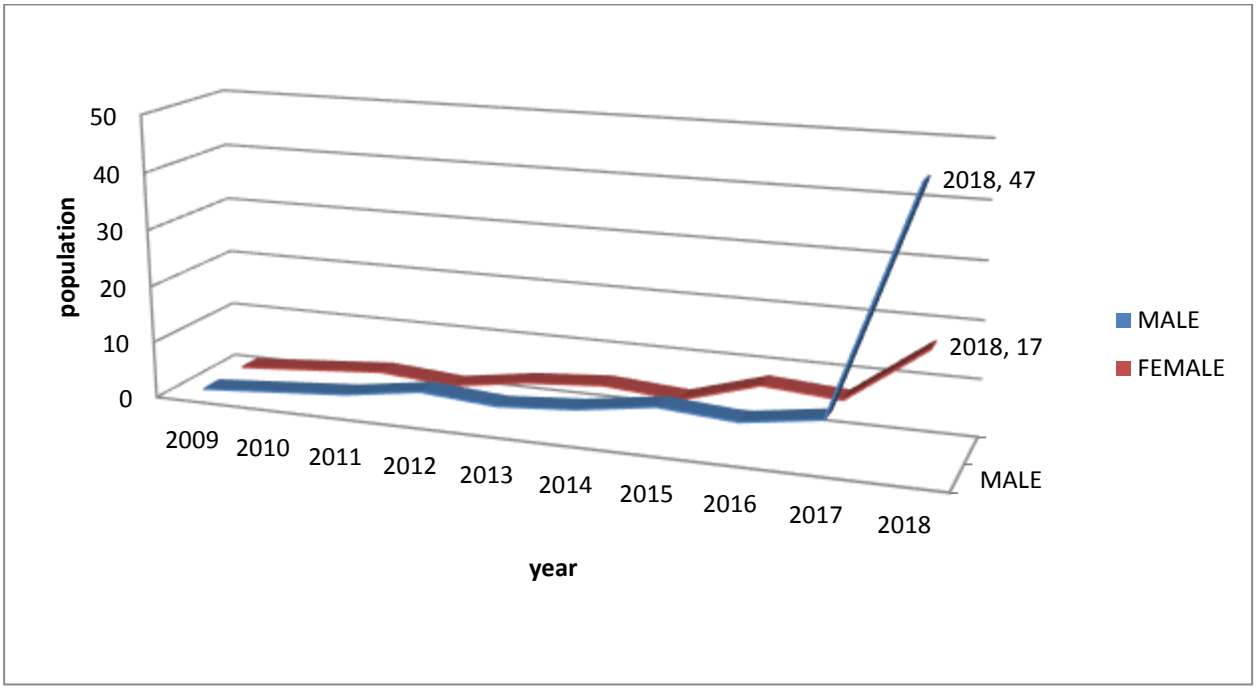

Figure 4 : Prevalence of HIV-TB co-infection in male and female population

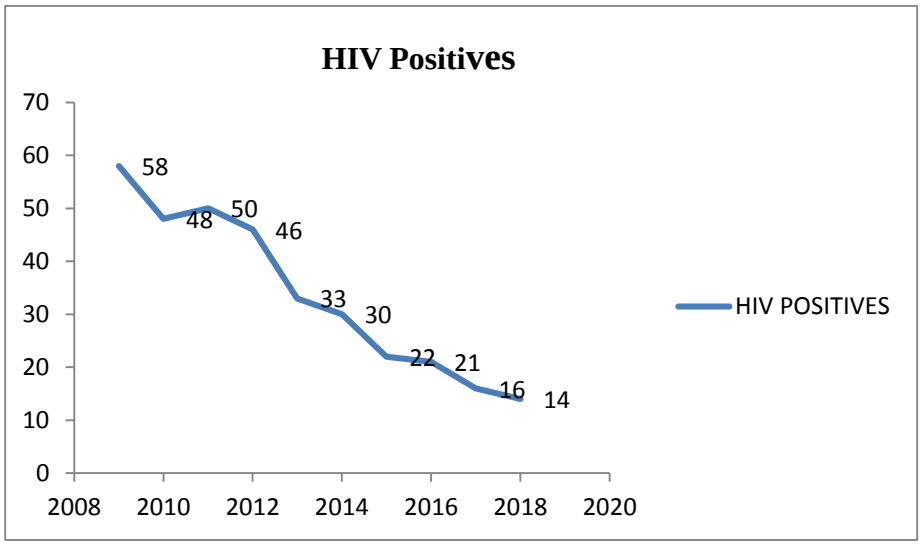

Figure 5: Prevalence of HIV infection in pregnant women

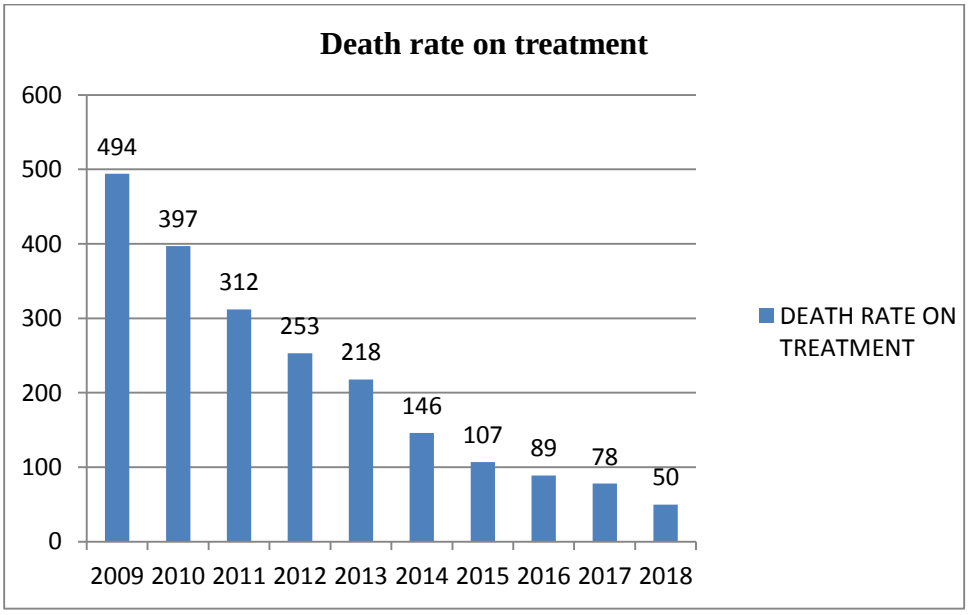

Figure 6: Death rate of HIV infection on art Treatment

Table 1: Prevalence of HIV infection in male and female population

Year	Male	Female
2009	1002	897
2010	774	726
2011	576	543
2012	484	498
2013	485	464
2014	448	426
2015	386	352
2016	383	342
2017	380	326
2018	327	328

Table1 reveals that, The proportion of HIV infection among those registering at this particular ART center gender wise 9.8%(M) & 8.81%(F) in 2009, 7.9%(M) & 7.1% (F) in 2010, 5.66%(M) & 5.33%(F) in 2011, 4.75%(M) & 4.89%(F) in 2012,4.76%(M) & 4.55%(F) in 2013,4.40%(M) & 4.18%(F) in 2014,3.79%(M) & 3.45%(F) in 2015,3.21%(M) & 3.36%(F) in 2016,3.76%(M) & 3.22%(F) in 2017 and 3.73%(M) & 3.20%(F) in 2018 until when data were included in this study.

The rate of HIV infection in this study was found to be higher among males comparable to studies across India. The heterosexual route of transmission predominated in this population among both genders (males = 5245 and females = 4902).

Table 2: Prevalence of HIV Population

Year	Population
2009	1904
2010	1499
2011	1119
2012	982
2013	949
2014	874
2015	743
2016	724
2017	706
2018	656

Table2 reveals that, The proportion of HIV infection among those registering at this particular ART center decreased year wise from 18.7% in 2009, 14.7% in 2010, 11.0% in 2011, 9.6% in 2012,9.3% in 2013,8.59% in 2014,7.32% in 2015,7.18% in 2016,6.98% in 2017 and 6.44% in 2018 until when data were included in this study.

Table 3: Prevalence of HIV-TB Co-infection in population

Year	Total
2009	2
2010	4
2011	6
2012	7
2013	8
2014	10
2015	11
2016	14
2017	15
2018	64

The proportion of HIV-TB coinfection among those registering at this particular ART center increased year wise from 1.41% in 2009, 2.83% in 2010, 4.25% in 2011, 4.96% in 2012,5.6% in

2013,7.09% in 2014,7.80% in 2015,9.92% in 2016,10.63% in 2017 to a high of 45.3% in 2018 until when data were included in this study.

Table 4 : Prevalence of HIV-TB Co-infection in male and female population

Year	Male	Female
2009	1	1
2010	2	2
2011	3	3
2012	5	2
2013	4	4
2014	5	5
2015	7	4
2016	6	8
2017	8	7
2018	47	17

Table 4 reveals that, The proportion of HIV infection among those registering at this particular ART center gender wise 0.7%(M) & 0.7%(F) in 2009, 1.41%(M) & 1.41% (F) in 2010, 2.12%(M) & 2.12%(F) in 2011, 3.54%(M) & 1.41%(F) in 2012,4.2.83%(M) & 2.83%(F) in 2013,3.54%(M) & 3.54%(F) in 2014,4.96%(M) & 2.83%(F) in 2015,4.25%(M) & 0.67%(F) in 2016,5.67%(M) & 4.96%(F) in 2017 and 33.3%(M) & 12.05%(F) in 2018 until when data were included in this study.

The rate of HIV-TB Co-infection in this study was found to be may equal in both the genders or higher among males comparable to females.

Table 5: Prevalence of HIV Infection in pregnant women

Year	HIV Positives
2009	58
2010	48
2011	50
2012	46
2013	33
2014	30
2015	22
2016	21
2017	16
2018	14

Table 5 Reveals that the proportion of HIV coinfection among the pregnant women those registering at this particular ART center decreased year wise from 17.15% in 2009, 14.20% in 2010, 14.79% in 2011, 13.6% in 2012,9.76% in 2013,8.87% in 2014,6.50% in 2015,6.21% in2016,4.73% in 2017 to a high of 4.14% in 2018 until when data were included in this study.

Table 6: Death rate of HIV infection on art Treatment

Year	Death rate on treatment
2009	494
2010	397
2011	312
2012	253
2013	218
2014	146
2015	107
2016	89
2017	78
2018	50

Table 6 reveals that The death rate of HIV infection among those registering at this particular ART center decreased year wise from 23.4% in 2009, 18.15% in 2010, 14.55% in 2011, 11.80% in 2012,10.16% in 2013,6.80% in 2014,4.99% in 2015,4.15% in2016,3.63% in 2017 to a high of 2.33% in 2018 until when data were included in this study.

Table 7 : ART Regimen Among HIV-TB CO-Infected Patients

Treatment regimen	Frequency
A-AL+ATV/r	15
A-ALE	16
A-TL+ATV/r	113
A-TL+PV/r	100
A-TLE	3659
A-TLN	11
AZL+ATV/r	72
AZL+LPV/r	1
A-ZLE	45
A-ZLN	728
P-AL+LPV/r	4
P-ALE	5
P-ALN	48
P-ALN adult	1
P-TLE adult	60
P-ZLPV/r	1
P-ZLE adult	2
P-ZLN	10
P-ZLN adult	7

Table 7 reveals that the frequency of treatment regimen is more for the brand name of A-TLE medicine. this medicine has combinations of drugs like abacavir, efavirenz, tenofovir and lamivudine. The next frequency of drug is A-ZLN medicine, this has combination of abacavir, zidovudine, lamivuduine and nevirapine.

CONCLUSION:

The prevalence of HIV–TB coinfection in this sample was 0.13%. About high (45.3%) of those sampled accessed ICTC as an entry point to the ART center. Coinfection was seen to be associated with reduced CD4 counts, which could hasten the progression to AIDS. It is imperative that physicians treating HIV-infected patients should aggressively identify those with M. tuberculosis in order to reduce the associated comorbidity resulting from the pairing of the infections, notwithstanding the imminent threat of multidrug-resistant and extremely drug-resistant TB on the rise. The increasing trend of HIV–TB cases observed in this population from 1.41% in 2009 to 45.3% in december 2018 is also a cause for concern. Greater focus of health interventions should be on the rural population as 88% of those co-infected were from rural areas in this study. Creating grass root level awareness coupled with aggressive case finding in suspected high-risk population may be key in preventing and early detection of the dual infections.

REFERENCES

1. Jaiswal RK, Srivastav S, Mahajan H. Socio demographic profile of TB-HIV co-infected patients in Bundelkhand Region, Uttar-Pradesh. Natl J Med Res. 2012; 2: 149–51.
2. Corbett EL, Watt CJ, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: Global trends and interactions with the HIV epidemic. Arch Intern Med. 2003; 163: 1009–1021.
3. Lawn S, Churchyard G. Epidemiology of HIV associated tuberculosis. Curr Opin HIV AIDS. 2009; 4: 325–33.
4. Geneva (Switzerland): Global tuberculosis control: Epidemiology, strategy, financing; 2009. World Health Organization World Health Organization; p. 411. WHO/HTM/TB/2009.
5. UNAIDS 2012. UNAIDS Annual Report. 2009. [Last accessed on August 14, 2013]. Available from: http://www.unaids.org/en/Availablefrom:http://data.unaids.org/pub/Report/2010/2009_annual_report_en.pdf .
6. WHO 2012. World Health Organization: TB-HIV 2011 Factsheet Source. [Last accessed on August 14, 2013].Availablefrom:http://www.who.int/en/Availablefrom:http://www.who.int/tb/publications/TBHIV_Facts_for_2011.pdf .

7. Joint United Nations Programme on HIV/AIDS (2011) World AIDS Day report. 2011. [Last accessed on2013April17].Availablefrom:http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/JC2216_WorldAIDSday_report_2011_en.pdf .
8. Meya DB, McAdam KP. The TB pandemic: An old problem seeking new solutions. J Intern Med. 2007;261 :309–29.
9. Girardi E, Raviglione MC, Antonucci G, Godfrey-Faussett P, Ippolito G. Impact of the HIV epidemic on the spread of other diseases: The case of tuberculosis. AIDS. 2000; 14(Suppl 3):S47–56.
10. Gao L, Zhou F, Li X, Jin Q. HIV/TB co-infection in Mainland China: A meta-analysis. PLoS One. 2010;5:10736.
11. Sharma SK, Mohan A, Kadhiravan T. HIV-TB co-infection: Epidemiology, diagnosis and management. Indian J Med Res. 2005; 121: 550–67.
12. Marfatia YS, Sharma A, Modi M. Overview of HIV/AIDS in India. Indian J Sex Transm Dis. 2007;28 : 1–5.
13. Sharma SK. Co-infection of human immunodeficiency virus (HIV) and tuberculosis: Indian perspective. Indian Journal Tuberc. 2004; 51: 5–16.
14. Narain JP, Lo YR. Epidemiology of HIV-TB in Asia. Indian J Med Res. 2004; 120: 277–89.
15. Londhey VA. HIV and tuberculosis-A" Cursed duo" in the HAART Era.[last accessed on August 14,2013]. Available from: http://www.japi.org/october-2009/article-01.pdf
16. American Thoracic Society and CDC. Diagnostic standards and classification of tuberculosis in adults and children. Am J Respir Crit Care Med 2000; 161 (4): 1376– 1395. http://ajrccm.atsjournals.org/cgi/reprint/161/4/1376
17. CDC. A strategic plan for the elimination of tuberculosis from the United States. MMWR1989;38(SupplNo.S3).www.cdc.gov/mmwr/preview/mmwrhtml/00001375.htm
18. CDC. Controlling tuberculosis in the United States: Recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America. MMWR 2005; 54 (No. RR-12). www.cdc.gov/mmwr/PDF/rr/rr5412.pdf
19. CDC. Essential components of a tuberculosis prevention and control program: Recommendations of the Advisory Council for the Elimination of Tuberculosis. MMWR1995; 44 (No.RR-11). www.cdc.gov/mmwr/preview/mmwrhtml/00038823.htm

20. CDC. Extensively drug-resistant tuberculosis-United States, 1993– 2006. MMWR2007;56(11)250– 3. www.cdc.gov/mmwr/preview/mmwrhtml/mm5611a3.htm
21. CDC. Management of persons exposed to multidrug-resistant tuberculosis. MMWR 1992;41 (No. RR-11): 59– 71. www.cdc.gov/mmwr/preview/mmwrhtml/00031296.htm
22. CDC. National action plan to combat multidrug-resistant tuberculosis. MMWR 1992; 41 (No. RR-11): 1– 48. www.cdc.gov/mmwr/preview/mmwrhtml/00031159.htm
23. De Cock KM, Jaffe HW, Curran JW. Reflections on 30 years of AIDS. Emerg Infect Dis 2011; 17:1044–104
24. Jaffe HW, Choi K, Thomas PA, Haverkos HW, Auerbach DM, Guinan ME, et al. National case–control study of Kaposi's sarcoma and Pneumocystis carinii pneumonia in homosexual men. Part 1: Epidemiologic results. Ann Intern Med 1983; 99:145–151.
25. Centers for Disease Control. Immunodeficiency among female sexual partners of males with acquired immune deficiency syndrome (AIDS) – New York. MMWR 1983; 31: 697–698.
26. Centers for Disease Control. Unexplained immunodeficiency and opportunistic infections in infants – New York, New Jersey, California. MMWR 1982; 31: 665–667.
27. Centers for Disease Control. Possible transfusion-associated acquired immune deficiency syndrome (AIDS) – California. MMWR 1982; 31: 652–654.
28. Anonymous. Needle stick transmission of HTLV-III from a patient infected in Africa. Lancet 1984; 324: 1376–1377.
29. Yassin MA, Cuevas LE. How many sputum smears are necessary for case finding in pulmonary tuberculosis? Trop Med Int Health 2003; 8: 927-32.
30. Dorman S. New diagnostic tests for tuberculosis: bench, bedside, and beyond. Clin Infect Dis 2010; 50 (Suppl 3): 173-7.
31. Mtei L, Matee M, Herfort O, Bakari M, Horsburgh CR, Waddell R, et al. High rates of clinical and subclinical tuberculosis among HIV-infected ambulatory subjects in Tanzania. Clin Infect Dis 2005; 40 : 1500-7.
32. World Health Organization. Improving the diagnosis and treatment of smear-negative pulmonary and extra pulmonary tuberculosis among adults and adolescents: recommendations for HIV-prevalent and resource-constrained settings. Geneva: World Health Organization; 2007.

33. World Health Organization. Policy guidelines for collaborative TB and HIV services for injecting and other drug users: an integrated approach. Geneva: World Health Organization, 2008.

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