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A STUDY OF HIV-TB COINFECTION USING CBNAAT IN A RURAL MEDICAL COLLEGE HOSPITAL

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ABSTRACT

Tuberculosis remains the most common opportunistic infection among HIV positive individuals. HIV-TB co-infected individuals are at high-risk of death. This study was conducted to find the prevalence of HIV –TB coinfection and trends at Government General Hospital, Government Medical College, Suryapet by using cartridge based nucleic acid amplification test [CBNAAT] as a diagnostic tool and to determine Rifampicin resistance among patients with HIV-TB co-infection. A total of 500 HIV patients were in the study. Out of these patients 71 MTB (14.2%) cases were detected. Of these 71 cases 68 (95.8%) cases were sensitive to Rifampicin (RIF) and 3 (4.2%) cases were showing resistance to Rifampicin (RIF) drug. Co-existence of HIV and tuberculosis is high and there is high prevalence of MDR tuberculosis in HIV patients. CBNAAT/RIF can be used as initial test in detecting Tuberculosis in PLHIV, because of its rapidity and detection of Rifampicin resistance

INTRODUCTION

Tuberculosis remains the most common opportunistic infection among HIV positive individuals. HIV-TB co-infected individuals are at high-risk of death.[1] HIV infection increases the risk of progression of latent TB infection to active TB disease thus increasing risk of death if not timely treated for both TB and HIV. Correspondingly, TB is the most common opportunistic infection and cause of mortality among people living with HIV (PLHIV).Common causes for mortality being difficuly to diagnose and treat owing to challenges related to comorbidity, pill burden, co-toxicity and drug interactions. HIV prevalence among incident TB patients is estimated to be 4.00%. 87,000 HIVassociated TB patients are emerging annually. By numbers India ranks 2nd in the world and accounts for about 10% of the global burden of HIV-associated TB. The mortality in this group is very high and every year 12,000 people die in india every year. .

MDR-TB and XDR-TB cause extremely high mortality. Therefore early diagnosis and prompt treatment of both TB and drug-resistant TB among PLHIV is essential.[3] As per RNTCP guidelines, CBNAAT is the preferred diagnostic technique for TB testing in PLHIV when compared to smear microscopy [2,3]. Sputum microscopy has poor sensitivity in detecting TB in PLHIV due to fewer organisms in sputum. In addition to diagnosing TB, there is also the need to test for drug resistance so as to provide the most effective treatment to curb the progress of drug-resistance TB (DR-TB) in patients and also to reduce risk of transmission in the community.[2] Although culture is currently the main tool for drug susceptibility testing (DST) and has a very high accuracy, it is highly specialized and has procedural (long duration) and operational (requires trained personnel and expensive laboratory equipment) difficulties. CBNAAT is a molecular test that detects the DNA of the TB bacteria in PLHIV. It uses sputum or any other biological specimen (except blood and blood-contaminated specimens) and can give a result in less than two hours. It can also detect the genetic mutations associated with resistance to the drug Rifampicin.[3,4] As per studies, the median sensitivity of smear microscopy was 52.8% (range 22.2–68.9), compared to 84.0% (58.3–91.7) with CBNAAT. The sensitivity of CBNAAT relates to the severity of symptoms, which may in turn reflect mycobacterial load. As per RNTCP guidelines, CBNAAT testing is now the standard of care for TB diagnosis in PLHIV [4,5]

Objective

- The objective of this study is to find the prevalence of HIV –TB coinfection and trends at Government General Hospital, Government Medical College, Suryapet.
- To use cartridge based nucleic acid amplification test [CBNAAT] as a diagmostic tool.
- To determine Rifampicin resistance among patients with HIV-TB co-infection.

MATERIALS AND METHODS

The study is done at Govenent General hospital, Government Medical College, Suryapet, India. Sputum samples were received from HIV patients attending ICTC clinic. HIV infection was diagnosed using Rapid kit tests (Meriscreen HIV 1-2 wb)for screening and confirmed using combaids-rs Advantage –ST HIV 1+2 Immuno dot Test kit and Signal HIV Flow Through HIV 1+2 Spot /Immunodot Test Kit.

After confirmation of HIV infection patients were immediately referred for cbnaat,to confirm the presence of tb coinfection. Patients were given Falcon tube with three layer packing system and asked to return the next day with early morning sputum sample after cleaning the oral cavity thoroughly, while giving the falcon tube for sputum collection a prescribed Profoma which includes details of patients like Name, Address, Age, Sex, Phone number was received in Microbiology laboratory.

CBNAAT or Genexpert is a molecular TB test which detects the DNA in TB bacteria.[4,5] It uses sputum sample and can give result in <2 hrs. It can also detect the genetic mutations associated with the resistance to the drug Rifampicin with high degree of specificity by using 3 specific primers and 5unique molecular probes . The test result can be read as

1. M.T.B detected /M.T.B not detected
2. Rifampicin resistance detected /not detected

Early morning sputum sample is collected in to falcon tube and reagent is added to the sample and kept for 20 minutes to liquefy sputum and sample is loaded into the catridge . The test procedure is made biosafe by tuberculocidal property of the assay's sample reagent.

RESULTS

Of total 500 HIV confirmed cases included in the study, MTB was detected in 71 (14.2%) patients as shown in [Fig-1]

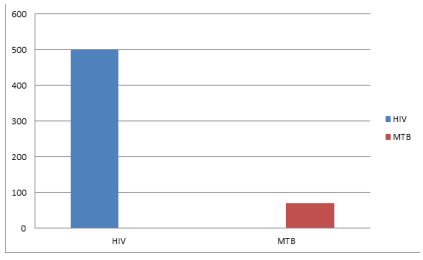

Fig -1 : HIV (500), MTB (71)

out of these 71 patients which were reported MTB positive –infected cases 68 (95.8%) cases were sensitive to Rifampicin (Rif)

and 3 (4.2%) cases were showing resistance to Rifampicin (Rif) Drug as shown in [Fig-2].

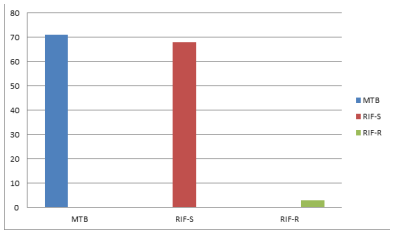

Fig -2 : MTB (71), RIF –S(68), RIF – R(3)

Sex wise distribution showed that 247 (49.4%) males and 252 (50.4%) females and 1(0.2%) were trans gendre. [Fig -3]

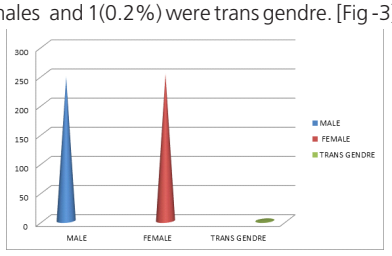

Fig – 3: Male (247): Female (252): Trans gendre (1)

DISCUSSION

This study was conducted at Government General Hospital, Government Medical college , Suryapet to determine HIV-TB coinfecton by using CBNAAT and to determine Rifampicin resistance among these patients. PLHIV need early diagnosis and treatment of active TB disease As per RNTCP guidelines, CBNAAT testing is now the standard of care for TB diagnosis in PLHIV .An estimated 920 000 people living with HIV (PLHIV) worldwide fell ill with TB in 2017. TB is the leading cause of death among people with HIV, accounting for some 300,000 people who died from HIV-associated TB in 2017, 32% of AIDS death were due to TB. Globally PLHIV were 20 times (17 – 23) more likely to fall ill with TB[6]

A total of 500 HIV confirmed cases were sent immediately for CBNAAT to check for coexisting tuberculosis infection. In our study of the total 500 hiv positive patients, 71 (14.2%) patients were found to be HIV-TB co-infected. Among the 500 HIV positive patients, 247 (49.4%) were males , 252 (504%) females and 1(0.2%) were trans gendre. Out of 71 HIV –TB coinfected cases, 3 (4.2%) were detected as rifampicin resistance cases and 68[95.8%]were detected as rifampicin sensitive.
In our study 14.2% patients were HIV-TB co-infected , which is in accordance with study conducted by Deepak Bansal et al which showed 14.07% of HIV-TB coinfected patients.[10]
In a study conducted at Osmania general hospital, Hyderabad, 16% showed HIV-TB coinfection[7]

High prevalence of MDR-TB was detected among HIV positive cases (15.78%) which in accordance with the study done by Sethi et al. for a span of 41 months who reported significantly higher association of MDR-TB (27.3%) with HIV seropositive patients as compared to HIV seronegative patients (15.4%) [8]

CONCLUSION

Tuberculosis is a major challenge for anti-retroviral therapy services in countries suffering with a high load of HIV co-infection along with a resource-limited socio-economical scenario.

The Xpert MTB/Rif test is a cartridge-based fully automated NAAT (nucleic acid amplification test) currently recommended by WHO and adopted by Revised National Tuberculosis Control Programme run by Government of India for detection of tuberculosis case and rifampicin resistance.[9,8] CBNAAT/RIF can be used as initial test in detecting Tuberculosis in PLHIV, because of its rapidity and detection of Rifampicin resistance

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