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Original Research Article

PREVALENCE OF MULTIDRUG RESISTANCE AMONG PULMONARY TUBERCULOSIS CASES IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Tuberculosis is the disease treatable with a full course of Anti TB drugs. Multi Drug Resistance Tuberculosis (MDR-TB) is described as the resistance to anyone of the first-line TB drugs Rifampicin and Isoniazid. The Extensively drug-resistant TB (XDR-TB) is called because of resistant of drugs to the 3 or more than three of the 6 types of second-line drugs. This is a matter of global concern. This study mainly focuses on the detection, comparison of prevalence of MDR-TB among New smear sputum Positive TB patients. And To determine the Pattern of drug resistance in them. **Materials and Methods:** A Cross Sectional Study were Conducted on 150 Patients in the Department of Microbiology, JLNMCH, Bhagalpur, Bihar from July 2022 to June 2023. The clinical history includes all risk factors like close contact with known MDR-TB or with person who died of TB/ failed treatment, failure to improve on current TB treatment and association with HIV or other immune suppressions. Diagnosis of TB will be confirmed as per Revised National Tuberculosis Control Programme (RNTCP) guidelines. DST will be done by detection of drug resistant gene for Rifampicin by Cartridge Based Nucleic Acid Amplification Test (CB-NAAT) [GeneXpert] at the Culture and Drug Susceptibility Testing Laboratory. **Result:** 172 cases of new smear positive TB patients are taken up for this study attending Outpatient department at JLNMCH, Bhagalpur. Out of which 150 cases are included for this study remaining are excluded as per criteria. Commonest age group involved in this study was 41-50 followed by 31-40. Males are most commonly affected (89%) Most commonly Labourers are commonly affected about 79% Cough (100%) followed by Expectoration, Haemoptysis and fever are the most common symptoms. In sample, sputum for AFB 43% patients were having 1+, followed by 27%,25% for 2+ and 3+ viz. In sample B, sputum for AFB 66% patients were having 1+, followed by 25%, 22% for 2+ and 3+ viz. All 150 patients are positive for AFB stain. **Conclusion:** Since, this is the indicator for prevalence of MDR-TB and all new smears positive patients should be screened for the same to early detection, prevention of spread and management of MDR-TB.

INTRODUCTION

Tuberculosis (TB) is an infectious disease which spread by Mycobacterium tuberculosis. TB primarily usually infects the lungs which are called as Pulmonary TB (PTB).[1] It also affects intestines, meanings, bones and joints, lymph nodes, skin and all other parts of the body. Tuberculosis usually presented with features like cough with or without expectoration associated with blood (Haemoptysis), intermittent low grade evening rise of temperature, appetite and weight loss, chest pain.[2] Tuberculosis is one of the main diseases of low socioeconomic status along with HIV. A one third of world's peoples is found to be affected by M. Tuberculosis, its infects others by rate of one per second. It is the infection of poor mostly on the young adults.[3] The most of the TB mortality were happened in the developing world. If the person was untreated with active TB disease will infect approximately almost ten to fifteen peoples every year and this causes spread of TB. The peoples having HIV Disease are most commonly to develop TB. The risk of infection of TB in persons with DM, Chronic disease which leads to immune compromised, low economic status, smokers are high.[4] The Estimation of Prevalence of drug resistance for TB in the community will be useful for creating new policies and treatment with effective drugs to complete cure and it will avoid the

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development of drug resistance. Drug resistance TB is the burden of illness in the society with several constraints in the management of TB patients. Using of Highly effective regimens utilizing the drugs that have not been prescribed previously and known to posses good anti mycobacterium activity needs to be implemented , which increases operational expenses in drugs and its distribution, monitoring the toxicity of the drugs and supervision of the administration of drugs to ensure the intake regularly.[5] Though the efficacy of the drugs in the management of pulmonary tuberculosis is well established, and its application on a mass level under the home based treatment programme gives much worry due to operational difficulties. With the poor drug compliance of patients causing markedly increases in number of patients having drug resistant TB bacilli in the community. Tuberculosis is the disease treatable with a full course of Anti TB drugs. Multi Drug Resistance Tuberculosis (MDR-TB) is described as the resistance to anyone of the first-line TB drugs Rifampicin and Isoniazid. The Extensively drug-resistant TB (XDR-TB) is called because of resistant of drugs to the 3 or more than three of the 6 types of second-line drugs. This is a matter of global concern.[6]

Aims and objectives

This study mainly focuses on the detection, comparison of prevalence of MDR-TB among New smear sputum Positive TB patients. And to determine the Pattern of drug resistance in them.

MATERIALS AND METHODS

A Cross Sectional Study were Conducted on 150 Patients in the Department of Microbiology, JLNMCH, Bhagalpur, Bihar from July 2022 to June 2023. The clinical history includes all risk factors like close contact with known MDR-TB or with person who died of TB/ failed treatment, failure to improve on current TB treatment and association with HIV or other immune suppressions. Diagnosis of TB will be confirmed as per Revised National Tuberculosis Control Programme (RNTCP) guidelines. DST will be done by detection of drug resistant gene for Rifampicin by Cartridge Based Nucleic Acid Amplification Test (CB-NAAT) [GeneXpert] at the Culture and Drug Susceptibility Testing Laboratory, Routine Investigations done all patients like Complete Haemogram, ESR, RBS, B. Urea, S. creatinine, Liver function Test, Urine Complete, Chest X Ray, HIV Test 1&2, CB-NAAT (GeneXpert)

Inclusion Criteria

1. Patients (Both Genders) diagnosed 100 numbers of new smear positive pulmonary tuberculosis patients at Coimbatore Medical College Hospital.
2. Age above 18 yrs.

Exclusion Criteria

1. Presence of secondary immunodeficiency states-HIV,
2. Diabetes Mellitus
3. Cancer patients,
4. Patients on corticosteroids or cytotoxic drugs
5. Extra pulmonary TB
6. Pregnancy and lactation
7. Patients not capable of giving consent (psychiatric patients).
8. Patients not willing to participate in the study (who refused to consent)

RESULTS

172 cases of new smear positive TB patients are taken up for this study attending Outpatient department at JLNMCH, Bhagalpur. Out of which 150 cases are included for this study remaining are excluded as per criteria. Commonest age group involved in this study was 41-50 followed by 31-40. Males are most commonly affected (89%) Most commonly Labourers are commonly affected about 79% Cough (100%) followed by Expectoration, Haemoptysis and fever are the most common symptoms. Most common finding in respiratory examination was crepitations about 59%. And this alone presents about 40% of patients. Wheezes were seen in 29% and bronchial breath sounds were seen in 37% of patients. Renal function test is normal for almost all patients. Totally 4 % of patients are having elevated S.Bilirubin, SGOT and SGPT. Nearly 29% of patients are anaemic. Most common finding in Chest X ray was infiltrations about 96%, total percent of cavitations was 48% and total percent of pleural effusion was 19%. And infiltration is most commonly seen in upper zone about 77% followed by mid zone involved about 59% and lower zone was 15%. Only 6% of patient's sputum sample were showing resistance to Rifampicin out of 150 patients.

Table 1: Distribution of Sputum Sample

Sample A	Frequency	%
0	18	18.0
1+	49	49.0
2+	27	27.0
3+	25	25.0
So2	11	11.0
So4	7	7.0
So5	9	9.0
So6	4	4.0
Total	150	100.0

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Table 2: Distribution of Rifampicin Resistance

RIF Resistance	Frequency	Percentage
No	146	96.0
Yes	4	4.0
Total	150	100

75% of patients were anaemic. Only 4% of patients were having abnormal Liver function test in view of raised S.Bilirubin, SGOT and SGPT levels. In sample, sputum for AFB 43% patients were having 1+, followed by 27%,25% for 2+ and 3+ viz. In sample B, sputum for AFB 66% patients were having 1+, followed by 25%,22% for 2+ and 3+ viz. All 150 patients are positive for AFB stain.

DISCUSSION

Out of 150 patients, 109 patients were male and remaining 41 were female. Majority of patients were in the age group of 41-50 (25%) followed by 31-40(23%). And about 79% of patients were labourers and followed by drivers.[7] There were 45% of smokers. Most common symptom was cough (150%), followed by Cough with Expectoration (97%), haemoptysis (74%) and fever (49%). Most common finding in general examination were pallor (77%) followed by poor nutrition (24%). And jaundice was seen in less than 1% patients. In auscultatory findings were seen Crepitations (79%), Bronchial breath sounds (44%) and wheeze (37%) in viz. And in laboratory findings anaemia seen in nearly 37% of patients, Elevated bilirubin, SGOT and SGPT levels are seen only 4%. In Chest x-ray findings most commonly infiltrations seen in upper zone followed by middle and lower zones. In this study, only 4 patients was having Rifampicin resistance seen in out of 150 patients detected by using the GeneXpert.[8] Drug Resistance surveillance (DRS) were conducted at many of the states in our country such as Maharashtra, Gujarat and Andhra Pradesh and its results gives as the prevalence of MDR TB was about 3-4% in new cases and nearly 19% in old cases.[9] The drug resistance TB – surveillance and resistance report 2014 of WHO shows about 5.3% cases were MDR-TB in the globe. Another study Sharma Et Al Prevalence of MDR-Tb in New Pulmonary Tuberculosis Cases estimated about 1.1 % for Rifampicin resistance. And Lukoye D et al did the study on drug resistance new and previously treated sputum smear-positive tuberculosis patients in Uganda shows the Rifampicin resistance about 1.8%.[10]

The burden of the MDR-TB is increasing worldwide. Treatment of the multi drug resistance TB is challenging and has community health problem especially in developing countries.[11] The present information from the various drug resistance surveillance studies says that the cases of MDR-TB are less in our country if we compare with the other developing countries. Because of inadequate treatment of the MDR-TB the burden of drug resistance tuberculosis may rise and pose as a public health emergency.[12] Clinical features of drug resistance TB is not much differs from the non drug resistance TB. If the Tubercle bacilli are sensitive to low concentration of the drug in a uniform manner then it is called as ―sensitive strains‖.[13] If the tubercle bacilli can grow in the higher concentration of drug it is called as resistant strain. In other means which can be explained as reduction of the sensitivity to the drug so that it can grow significantly in higher concentration of the drug (Dr.D.A.Mitchison 1961) and definitely shows different characteristics from that of wild strain which had never come in contact with the wild strain.[14] The definition of drug resistance of Mycobacterium tuberculosis was adopted by the international group of specialists assembled by the world Health Organization (WHO) in 1969.[15] This definition was established by testing a large number of wild strains against three drugs available at the time and minimal inhibitory concentrations (MIC) of these drugs where established in starch Free Lowenstein Jensen (LJ) Medium.[16-18] It was suggested that a strain would be considered resistant if one percent or more of the bacterial population was resistant to a designated concentration of drug. With monotheraphy like streptomycin alone or inadequate therapy the number of sensitive bacilli decreased while the resistant bacilli increased in lung cavities of the tubercular patient, this has been called the ―Fall and Rise‖ phenomenon.[19.20]

CONCLUSION

In this study most common manifestations of new sputum pulmonary tuberculosis were cough with expectoration followed by fever, weight loss, haemoptysis. Most commonly upper zone of the lungs were involved. Most of the patients showed decreased haemoglobin, white blood cells and increases ESR. Possibility of drug resistance is seen new smear positive pulmonary tuberculosis. Resistance to Rifampicin were found in new sputum positive TB patients by using GeneXpert. Prevalence of Drug resistance to Rifampicin in our locality is about 2%. To compare with national and international prevalence it was low. Multi Drug Resistance Tuberculosis (MDR-TB) is described as the resistance to anyone of the first-line TB drugs Rifampicin and Isoniazid. RIF resistance is the main indictor of MDR TB because the resistance to RIF mostly combined with the resistance for Isoniazid. Since, this is the indicator for prevalence of MDR-TB and all new smears positive patients should be screened for the same to early detection, prevention of spread and management of MDR-TB.

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REFERENCES

1. Sakula A. Robert Koch (1843--1910): founder of the science of bacteriology and discoverer of the tubercle bacillus. A study of his life and work. Br J Dis Chest. 1979 Oct;73(4):389–394.
2. Gutierrez MC, Brisse S, Brosch R, Fabre M, Omais B, Marmiesse M et al. Ancientorigin and gene mosaicism of the progenitor of Mycobacterium tuberculosis. PLoS Pathog 2005 Sep;1(1):e5.
3. Hershkovitz I, Donoghue HD, Minnikin DE, Besra GS, Lee OY, Gernaey AM et al. Detection and molecular characterization of 9000-year-old Mycobacterium tuberculosis from a neolithic settlement in the eastern mediterranean. PLoS ONE 2008;3(10):e3426.
4. Tuberculosis. Academic dictionaries and encyclopedias. [Online] 2006 [cited 2010 Sep 10];Availablefrom:URL:http://web.archive.org/web/20050211173218/http://classics.mit.edu/Hippocrates/aphorisms.mb.txt Aphorisms.
5. Al-Sharrah YA. The Arab Tradition of Medical Education and its Relationship withthe European Tradition. Springer 2003;33(4):413-25.
6. Bonah C. The experimental stable of the BCG vaccine: safety, efficacy, proof, and standards, 1921–1933. Stud Hist Philos Biol Biomed Sci 2005;36(4):696-721.
7. Nobel Foundation. The Nobel Prize in Physiology or Medicine 1905. [cited 2010 Sep10];81Availablefrom:URL:http://de.wikipedia.org/.../Simple:Nobel_Prize_in_Physioloor_Medicine .
8. Kritski A, Cataldi A, Reyes A, Martin A, Gicquel B, Martin C et al. Tuberculosis 1. 2007. [cited 201
9. World Health Organization (2009). "Epidemiology" Global tuberculosis control:epidemiology, strategy, financing. pp. 6–33. ISBN 978-92-4-156380-2. Retrieved on12 November 2009.
10. http://www.who.int/tb/advisory_bodies/impact_measurement_taskforce/meetings/global_consultation_doc08a_who_methods_children.pdf
11. WHO annual report 2014 and 2015
12. http://www.tbcindia.nic.in/pdfs/TB%20INDIA%202014.pdf
13. http://www.who.int/tb/publications/global_report/gtbr14_supplement_web_v3.pdf
14. Emergence of Mycobacterium tuberculosis with extensive resistance to secondline drugs, worldwide, 2000–2014. [Online] 2006 [cited 2010 July 12]; Available from: URL:http://www.ncbi.nlm.nih.gov/pubmed/16557213
15. Farmer P. The major infectious diseases in the world--to treat not to treat Engl. J. Med July 2022;345(3):208-10.
16. http://www.tbcindia.nic.in/rntcp.html 82
17. http://www.who.int/tb/strategy/en/
18. http://www.tbfacts.org/tb-india/
19. http://www.tbcindia.nic.in/pdfs/Guidelines%20for%20PMDT%20in%20India%20%20May%202023.pdf
20. Harrison principle of Internal Medicine 19th edition

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