TUBERCULOSIS AND PHYSIOLOGICAL IMPACT

Mou Batalik , Ayesha Ansari, Megha Nair, E. Rajshree, Sejal Sudhir Kulkarni

Tuberculosis

ABSTRACT
Tuberculosis is also known as TB. Not everyone who becomes infected with TB gets sick, but if you do get sick you need to be treated. Tuberculosis is one among the prime root of death and almost throughout the world. past studies conclude that Tuberculosis is most common risk factor, if not treated in the early stages in addition to the symptoms which usually causes impairment in the human body the commonest and most unbearable is sensation of pain while breathing and coughing. this article discusses the epidemiology of tuberculosis causes and cases in India role of anti-bacterial agents, managing healthy diet, following with antibiotics will suppress the causation of Tuberculosis.

Keywords: tuberculosis, antibacterial agent, antibiotic balanced diet, impairment, breathing, coughing, India worldwide.

INTRODUCTION

Tuberculosis is one among the leading cause of death and disability worldwide along with stroke Heart Attack cancer r Road and traffic accident tuberculosis is a common illness. if left untreated it can be deadliest. mycobacterium tuberculosis is a bacterial agent causing tuberculosis. mycobacterium is a bacterium which mainly affects lung simultaneously other organs brain, spine, Kidneys. tuberculosis sometimes become non identical because if one is infected by tuberculosis but doesn't have Symptoms it is termed as latent TB where it is in dormant condition but when immunity of the person get suppresses TB become active which results in of sensation of pain in breathing, joint pains, body aches, weakness sudden weight loss. under nutrition, slum dwelling, indoor air pollution and alcohol intake can be commonest risk factor. the current research studies states that TB can be genetically or non-genetically transmitted.
In addition, we would also discuss about the

role of white blood cells and maintaining healthy liver.

Epidemiology of Tuberculosis in India

A according to the past research the estimated adjusted prevalence rate of tuberculosis ranges 130 -184.0 /100,000 in rural areas 144.9 - 150.6 to 100,000 in urban areas, the incidence rate is 77 with 6 deaths per 100,000 population. Compare to South India East India and West India Northern side has more cases in India more men are affected from TB then woman regarding the tuberculosis subtypes there are two types.

Active tuberculosis the individual who is carrying the organism has active symptoms and can transmit the infection to other

Latent tuberculosis the individual carries the bacteria but does not exhibit any symptoms until the immunity of the individual is getting suppressed it can be transferred genetically through mother to children.

Tuberculosis as a Risk Factor

Some people develop TB disease soon after becoming infected (within weeks) before their immune system can fight the TB bacteria. Other people may get sick years later, when their immune system becomes weak for another reason.

Overall, about 5 to 10% of infected persons who do not receive treatment for latent TB infection will develop TB disease at some time in their lives. For persons whose immune systems are weak, especially those with HIV infection, the risk of developing TB disease is much higher than for persons with normal immune systems.

Generally, persons at high risk for developing TB disease fall into two categories: Persons who have been recently infected with TB bacteria Persons with medical conditions that weaken the immune system.

This includes:

Close contacts of a person with infectious TB disease Persons who have immigrated from areas of the world with high rates of TB Children less than 5 years of age who have a positive TB test Groups with high rates of TB transmission, such as homeless persons, injection drug users, and persons with HIV infection Persons who work or reside with people who are at high risk for TB in facilities or institutions such as hospitals, homeless shelters, correctional facilities, nursing homes, and residential homes for those with HIV .

Gender Differences

Globally 64% of tuberculosis cases are attributed to men and boys. This means that for every woman and girl, two men get tuberculosis. Men are also less likely to have their tb detected and reported than women. Men account for 63% of deaths among HIV-negative people. In many places men tend to be engaged in behaviors that increase the risk of tuberculosis such as smoking, alcohol consumption and drug use. On the other hand, cultural norms and inequalities may make women less likely than men to access TB treatment and prevention services. For women and girls delays in diagnosis and inefficiencies in services maybe due to increased stigma associated with TB and lack of integration of TB services with reproductive and maternal and child health services. Women may find it difficult to access TB services because of the male family members may be reluctant to pay for the TB services and women's health may not be considered as important as in male families. Women typically wait longer than men for diagnosis and treatment, so shortages may prevent them from seeking medical attention from privacy or parenting healthcare organizations. People affected by TB are often stigmatized and discriminated against because of their TB status and medical history. As TB is often associated with poverty and other socially undesirable behaviors and living conditions people with TB maybe discriminated or stigmatized due to their socio-economic status.

Impact of Tuberculosis

The majority of persons with tuberculosis are in their prime working years. All age groups, though, are in danger. In low- and middle-income nations, there are more than 80% of cases and fatalities. Everywhere in the world, TB is a problem. The WHO's South-East Asian Region had the newest TB cases in 2021 (46%), followed by the African Region (23%) and the Western Pacific (18%). The 30 countries with the highest TB burden accounted for almost 87% of new TB cases, with Bangladesh, China, the Democratic Republic of the Congo, India, Indonesia, Nigeria, Pakistan, and the Philippines accounting for more than two thirds of the global total. According to the most recent national TB patient cost survey results, over one in two TB-affected households have costs that exceed 20% of their household income globally. A person's chance of getting sick is higher if they have a weakened immune system, which includes those who use tobacco, are undernourished, have diabetes, or live with HIV. In 2021, there were 2.2 million new TB cases globally that could be attributed to malnutrition, 740 000 new TB cases globally that could be attributed to alcohol use disorder, and 690 000 new TB cases that could be attributed to smoking.

Management of TB in Patients

If you have been infected with TB but do not have any active TB symptoms you should get preventive therapy. This treatment kills germs that could cause problems if the disease becomes active. The most common preventive therapy is daily pill for six to nine months of isoniazid (INH). You are not contagious if you have latent TB.

If you have an active TB, you will be treated with a combination of antibacterial medications for a period of six to 12 months. The most common treatment for active TB is INH in combination with three other drugs - rifampin, pyrazinamide and ethambutol. You may feel better by taking these drugs a few weeks but treating TB takes much longer time than other bacterial infections. You must take your medications as prescribed by the doctor the entire course or you could get sick again or

have harder time fighting it. not completing your entire course of medication could also contribute to drug-resistant TB.

Drug resistant TB means that some drugs that initially given to treat TB will no longer be able to fight the bacteria in your

HIV co-infection, drug-resistant Mtb strains now body. TB that is resistant to more than one drug is called a multidrug resistant TB is very dangerous. The treatment to this type of TB can take much longer, 20-30 months to complete and can have severe side effects.

you must finish your medicine and take the drugs as prescribed. IF you stop taking the drugs too soon you may become sick again and spread the pathogen to others. If you take the drugs incorrectly TB germs can become drug resistant making it harder for you to get better. while you are in the treatment you will need regular checkups to make sure your treatment is working. everybody reacts to the drug differently but there are side effects associated with the medications such as upset stomach, nausea, loss of appetite, numbness in feet or hands, yellowish skin or eyes, weakness, fever, dark colored urine. It is important to let your doctor know if unusual symptoms appear. TB drugs can be toxic to your liver and your side effects may be a warning sign of liver damage. If you are having trouble with tingling and numbness your doctor may prescribe medicines to prevent it.

1] if you are taking TB medicine on your own its important to get into a routine

2] take your medicine at the same time every day

3] each day when you take your medicine mark it off on your calendar

4] ask your healthcare provider what to do if you forget to take your medicine

if you have active TB, it will take a few weeks of treatment before you can't spread TB bacteria to others don't resume your day-to-day activities until your healthcare provider tells to so. when you cough or sneeze or laugh cover your mouth with a tissue, cover the tissue in closed bag and dispose it away. avoid close contact with anyone. air out your room often so the TB germs don't stay in the room and infect someone. The long treatment plan can be challenging. anger or frustration are normal. talking to someone such as a therapist might help you develop coping strategies.

What Does Medical Science Prefer?

Tuberculosis (TB) has been a persistent public health concern for hundreds of years. Despite advances in medicine and science, eliminating this disease has been beyond our reach. Many organizations, including the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health (NIH), have expressed their commitment to advancing biomedical research in Tuberculosis in order to increase our understanding of the causative pathogen and the disease. This basic knowledge is a crucial first step in the development and implementation of new therapeutics, vaccines and diagnostics. Collaboration between researchers is a major component to accomplishing this goal; product development can no longer be limited to separate programs. Rather, the interconnectedness and possible combination of interventions must be studied. Despite may advance in medical science and health care it has been impossible to eliminate TB as a public concern.

Many factors have been found advantageous to the survival of Mycobacterium tuberculosis (Mtb) in humans including growing population and urban environment and the resulting close living conditions, increase in the number of persons co-infected with HIV who are more susceptible to developing TB and increasing number of drug resistant TB cases in which the standard drugs are failing. It is to be noted that more than one third of the world's population is estimated to harbor Mtb and can serve as the reservoir for active disease.

Intensified by HIV/AIDS in countries where both the diseases are endemic. The epidemic now takes nearly 2 million lives each year. Decades of treatments have led to drug

resistant TB that complicates cure. In countries with high rates of transmission and account for an increasing portion of new TB cases. The Global Plan to Stop TB 2011–2015,' issued by the Stop TB Partnership (housed at the World Health Organization (WHO)), has set ambitious goals to halve TB prevalence and death rates by 2015, and to eliminate TB by 2050.12 (Elimination is defined as less than one case of TB per one million population per year.) This plan is also tied to the United Nation's Millennium Development Goals.

To accomplish these milestones, scientific and biomedical innovations such as those supported by the National Institute of Allergy and Infectious Diseases (NIAID) are desperately needed. Improvements in existing TB care programs alone are no longer sufficient. The World Health Organization (WHO) recently released a World Tuberculosis report noting the impact of Covid-19 pandemic on the diagnosis, treatment of disease Tuberculosis all over the world. According to the report around 10.6 million people across the world were diagnosed with TB in 2021, an increase of 4.5% from 2020, while 1.6 million patients died of the disease. Of the total TB deaths, 187,000 patients were also positive for HIV (human immunodeficiency virus). Nearly 82% of global TB deaths among HIV-negative people occurred in the African and South-East Asia regions. The reported number of people newly diagnosed with TB fell from 7.1 million in 2019 to 5.8 million in 2020. There was a partial recovery to 6.4 million in 2021, but this was still well below pre-pandemic levels.

better. while you are in the treatment you will need regular checkups to make sure your treatment is working. everybody reacts to the drug differently but there are side effects associated with the medications such as upset stomach, nausea, loss of appetite, numbness in feet or hands, yellowish skin or eyes, weakness, fever, dark colored urine. It is important to let your doctor know if unusual symptoms appear. TB drugs can be toxic to your liver and your side effects may be a warning sign of liver damage. If you are having trouble with tingling and numbness your doctor may prescribe medicines to prevent it.

How white blood cells help and individual to fight against active Tb bacteria?

The total white blood cell count decrease during the treatment of tuberculosis in the WBC differential count the number of neutrophils and monocytes where increased in active Tb group whereas ($p<0.0010$) those of lymphocytes where significantly decreased($p<0.0100$) macrophile and CD4+T for cells Lymphocytes leads to the formation of granuloma Where are naturally contemplate the support system of immune defense against tuberculosis macrophage ingest the bacterial agent into a vacuole and then break them down by destroying their chemical agents .

How does tuberculosis affect Red blood cells?

RBC count Mein drop up to 12.5 g/ DL in women and 13.5 g/ DL in in men. Anemia is common in tuberculosis predominantly normocytic normochromic anemia in mild to moderate forms many patients with active pulmonary tuberculosis exhibit decrease level of hemoglobin anemia in tuberculosis is more often due to nutritional deficiency Malabsorption syndrome failure of iron utilization and bone marrow suppression.

How does liver get affected during the treatment?

The reason behind the weakness of liver is types of drug like Isoniazid rifampin and pyrazinamide are present in the treatment which is medically term as a factor toxicity of drugs enzyme for drug metabolism is hepatocytic microsome may have congruential defect malformation low activity et cetera which later leads to the formation of Acetic injury avoiding alcoholic beverages smoking taking healthy diet can help in maintaining the healthy liver. Currently researcher recommend careful liver function test monitoring of patient on anti-tuberculosis medication with liver disease abnormal baseline LFTs.

Treatment of Tuberculosis in the very elderly

The treatment success rate among people with TB < 65 years was 82%, and the rate decreased among the older age groups (65−74 years; 76%, 75−84 years; 65%, ≥85 years; 46%) [50]. The low treatment success rate among older adults has been ascribed to a high death rate during TB treatment.

Table 1

Proportion of Older TB patients among the cohort of TB patients registered under RNTCP in 12 districts of Tamil nadu, South India,2022-2023 .

Type of TB	All TB patients	Number of Older TB patients	Proportion of Older TB patients [a]
New Sputum Positive	3926	702	18
New Sputum Negative	2878	449	16
New Extra-pulmonary	2207	173	8
New Others	2	0	0
Treatment After Relapse	615	75	12
Treatment After Failure	76	10	13
Treatment After Loss to follow up	456	44	10
Retreatment Others	317	32	10
Total	10477	1485	14

Of 10,477 TB patients registered in the 12 selected districts of Tamil Nādu, 1485 (14%) were older TB patients (**Table 1**)**.** The proportion of older TB patients was highest among those categorized as New Sputum Positive (NSP) followed by New Sputum Negative (NSN) and treatment after failure. The case notification among older TB patients was calculated to be 259 per 100,000 population as compared to the other TB patients where it was found to be 142 per 100,000 population.

Conclusion

With a prevalence of 16%, TB among elderly patients stands out as an urgent and important concern that needs to be handled for effective control of the ongoing TB pandemic. Non-elderly TB patients were poorly compliant than the older ones, but the outcomes were statistically unfavourable in the latter. TB among elderly patients causes more deaths and other unfavourable outcomes. The need for more focused attention to this group of TB patients is more relevant considering us strive to achieve the ambitious targets of End TB in India by 2025.

References

1. World Health Organization (2012) Global Tuberculosis Control 2012.

2. Central Tuberculosis Division (2012) Tuberculosis India 2012. Annual Report of the Revised National Tuberculosis Control Programme. Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India.

3. Mukherjee A, Saha I, Paul B (2008) Tuberculosis in Patients Below and Above 60 years and Their Treatment Outcome Under RNTCP – A study in Rural West Bengal, India. *J Indian Acad Geriatr*

4. Touré NO, Dia Kane Y, Diatta A, Ba Diop S, Niang A, et al. (2010) Tuberculosis in elderly persons]. *Rev Mal Respir*

5. Pardeshi G, Deshmukh D (2007) Disease characteristics and treatment outcome in elderly tuberculosis patients on DOTS. *Indian Journal of Community Medicine*

6. Sood R (2000) The Problem of Geriatric Tuberculosis. *Journal of Indian Academy of Clinical Medicine*

7. Rajagopalan S (2001) Tuberculosis and aging: a global health problem. Clin. Infect.

8. Registrar General and Census Commissioner (2012) Annual Health Survey-2010–11. Ministry of Home Affairs, Government of India. New Delhi.

9. Chan-Yeung M, Noertjojo K, Tan J, Chan SL, Tam CM (2002) Tuberculosis in the elderly in Hong Kong. Int. J. Tuberc. *Lung*

10. Leung CC, Yew WW, Chan CK, Chau CH, Tam CM, et al. (2002) Tuberculosis in older people: a retrospective and comparative study from Hong Kong. *J Am Geriatr*

11. Gholamali G, Gholamhossain A, Esfahan A (2007) Comparison of Clinical and Radiology Manifestation of Pulmonary Tuberculosis in Younger and Elderly Patients. *Journal of Medical Sciences (Faisalabad)*

16. World Health Organization. Treatment of Tuberculosis Guidelines, 4th Edition. World Health Organization (2010)

17. Central TB Division (2011) RNTCP Performance Report, India: Second Quarter. New Delhi: Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India..

18. Monthly Bulletin on Family Welfare, Directorate of Family welfare, Tamil Nadu, (2006) Reproductive Child Health,.

20. Subramani R (2008) Rapid decline in prevalence of pulmonary tuberculosis after DOTS implementation in a rural area of South India. Int. J. Tuberc. *Lung Dis* 12: 916–20.

21. Gopi PG, Subramani R, Radhakrishna S, Kolappan C, Sadacharam K, et al. (2003) A baseline survey of the prevalence of tuberculosis in a community in south India at the commencement of a DOTS programme. Int. J. Tuberc. *Lung Dis*

22. Balakrishnan S, Vijayan S, Nair S, Subramoniapillai J, Mrithyunjayan S, et al. (2012) High Diabetes Prevalence among Tuberculosis Cases in Kerala, India. *PloS one*

23. Viswanathan V, Kumpatla S, Aravindalochanan V, Rajan R, Chinnasamy C, et al. (2012) Prevalence of diabetes and pre-diabetes and associated risk factors among tuberculosis patients in India. *PloS one*

24. Ministry of Health and Family Welfare Government of India.