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TUBERCULOSIS : A Comprehensive Review

Ranvir¹, Zulphakar Ali²

^{1*}Research Scholar, Department of Pharmacy, Faculty of Pharmaceutical Science, Mewar University, Gangrar, Chittorgarh 312901, Rajasthan, India. ²Assistant Professor, Department of Pharmacy, Faculty of Pharmaceutical Science, Mewar University, Gangrar, Chittorgarh 312901, Rajasthan, India. Email: muneermir9492@gmail.com

Email: zulphakar@mewaruniversity.co.in

ORCID ID: <u>https://orcid.org/0009-0004-6519-2717</u>

ABSTRACT :

A dangerous infectious disease that mostly affects the lungs, tuberculosis (TB) is brought on by Mycobacterium tuberculosis. It is a serious health risk that spreads through airborne droplets, particularly in developing countries. Frequent symptoms include fever, weight loss, and a persistent cough. Sputum tests and chest X-rays are used in the diagnosis process. Several months of medication, such as isoniazid and rifampicin, are needed for treatment. Treatment has become more difficult as a result of the introduction of drug-resistant strains (MDR/XDR-TB). Pharmacists are essential in reducing resistance, monitoring medication adherence, and providing patient counseling. This article examines the pathophysiology, management, and role of pharmacists in preventing the spread of tuberculosis.

1. What is meant by tuberculosis (TB)?

The infectious bacterial disease known as tuberculosis (TB) is brought on by Mycobacterium tuberculosis. Although it typically targets the lungs, it can also extend to the brain, spine, kidneys, lymph nodes, and other regions of the body. When someone with active TB disease in their lungs coughs, sneezes, or simply speaks, bacteria are released into the air, which is how TB spreads. These germs can be inhaled by those in close proximity, leading to infection.

2. Types of Tuberculosis:

Pulmonary and extra-pulmonary TB are the two basic types of tuberculosis.

The most prevalent type of TB affects the lungs and is called pulmonary TB. It is the contagious type of tuberculosis that spreads readily through the atmosphere.

Outside of the lungs, extra-pulmonary TB can develop in the kidneys, lymph nodes, brain (TB meningitis), and bones. Although this kind is typically not contagious, it can be quite dangerous if left untreated.

3. Causes of Tuberculosis:

Mycobacterium tuberculosis is the organism that causes tuberculosis. Tiny droplets containing the bacteria are released into the air when a person with active tuberculosis of the lungs coughs or sneezes. The bacteria can enter the lungs of another person who breaths in these droplets and start to grow, particularly if that person has a compromised immune system. Sharing meals, touching surfaces, or shaking hands are not ways that tuberculosis is transferred.

4. TB Infection Risk Factors:

Some people are more likely to get tuberculosis than others. These consist of:

Individuals with weakened immune systems, like those living with HIV/AIDS People living in congested or inadequately ventilated environments Individuals suffering from malnutrition Smokers and those suffering from other lung conditions Individuals who have intimate contact with TB patients, such as family members or caregivers

Healthcare professionals who frequently come into contact with TB patients

All of these ailments either make the body more susceptible to the bacteria or weaken its defenses against it.

5. Tuberculosis Symptoms:

Depending on the area of the body that is infected, TB symptoms might differ, however the most prevalent type, pulmonary TB, comprises the following:

A chronic cough that lasts longer than two to three weeks

Coughing up mucous or blood

Chest pain, particularly during coughing or breathing

Chills and fever

Sweating a lot while you sleep is known as night sweats.

Unaccounted-for weight loss

Severe fatigue and weakness

The symptoms of extra-pulmonary TB, which occurs when TB spreads to other parts of the body, vary depending on the affected area. For instance, spinal TB may cause back pain, while lymph node TB may cause swelling in the neck.

6. Tuberculosis Diagnosis:

A number of tests are used to detect TB. Among the most widely used diagnostic techniques are:

Sputum Test: Testing for TB bacteria by analyzing lung mucus, or phlegm.

A chest X-ray can help detect tuberculosis in the lungs by displaying irregular shadows or damage.

Mantoux Tuberculin Skin Test (TST): To check for TB infection, a little injection is administered beneath the skin.

Blood tests: These are particularly helpful for those who have had the BCG vaccine because they can also identify TB bacteria.

When TB affects organs other than the lungs, CT scans and MRIs are used.

Early detection aids in limiting TB's spread and effects.

7. Tuberculosis Treatment:

Although TB can be cured, a long-term treatment strategy is necessary. Taking many antibiotics over the course of six to nine months is the most typical course of treatment. Typical medications include:

Isoniazid (INH)

Rifampicin (RIF)

PZA, or pyrazinamide

EMB, or ethambutol

Patients should take their medications daily and for the entire prescribed duration. Early treatment cessation may cause the TB germs to develop antibiotic resistance, making the illness considerably more difficult to treat. The WHO suggests DOTS (Directly Observed Treatment Short-course), in which a medical professional observes the patient taking their medication, to assist patients in adhering to their treatment.

8. Prevention of Tuberculosis:

Immunization, proper hygiene, and early treatment are all part of the prevention of tuberculosis.

Infants who receive the BCG vaccine are protected against severe forms of childhood tuberculosis.

When coughing or sneezing, people with tuberculosis should cover their mouth.

The spread of the bacterium is minimized by adequate ventilation and avoiding crowded areas.

TB patients who receive early diagnosis and treatment shield others from infection.

Regular checkups and maybe preventive medication are recommended for those who have intimate contact with TB patients.

9. Complications of Untreated TB:

Serious complications like the following might arise from improperly treated TB:

Long-term breathing issues brought on by permanent lung damage

If TB spreads to the brain, meningitis may result.

paralysis or spinal abnormalities (if it affects the spine)

harm to the liver or kidneys

Death, particularly in those with weakened immune systems

For this reason, early and comprehensive TB treatment is crucial.

10. Latent TB vs Active TB:

There are two stages of TB infection:

- Latent TB: The person is infected with TB bacteria, but they are not active. The person has no symptoms and is not contagious, but the bacteria can become active later.
- Active TB: The bacteria are active and multiplying, causing symptoms. This form can spread to others and requires immediate treatment.

11. Drug-Resistant TB (DR-TB):

Sometimes TB bacteria become resistant to standard medicines. This is called Drug-Resistant TB and is harder to treat.

- MDR-TB (Multi-Drug Resistant TB): Resistant to two key drugs (INH and RIF)
- **XDR-TB** (Extensively Drug-Resistant TB): Resistant to even more drugs

Drug-resistant TB needs stronger medicines for a longer time (18-24 months) and may have more side effects.

12. TB and HIV Co-infection:

People with HIV/AIDS have a much weaker immune system, which makes them more likely to develop active TB if infected.

- TB is one of the leading causes of death among people living with HIV.
 - It's important to test for both diseases if one is diagnosed, and treat both together.

13. TB in Children:

Children can also get TB, especially if they are in close contact with an infected adult.

- Symptoms in children may be milder or different, such as failure to gain weight, fever, and poor appetite.
- TB in children is often extra-pulmonary and requires special care during treatment.

14. TB in Pregnancy:

- Pregnant women can get TB, and it must be treated **carefully** to protect both mother and baby.
 - Untreated TB during pregnancy can lead to low birth weight, premature birth, or even transmission to the baby.
 - Most TB medicines are **safe during pregnancy**, but they should be taken under medical supervision.
- 15. TB Surveillance and Control Programs:

Governments and health organizations run TB control programs to reduce infection and deaths.

- **DOTS strategy** (Directly Observed Therapy) ensures patients complete their treatment.
- National TB Elimination Programs (NTEP) offer free diagnosis and treatment, especially in India and other countries.
- Awareness campaigns help people recognize symptoms and seek treatment early.

16. Nutrition and TB:

Good nutrition plays an important role in recovering from TB.

- TB patients often suffer from weight loss and weakness.
- A healthy diet with protein, vitamins, and minerals helps the body fight infection and heal faster.
- Malnourished people are also more likely to get infected with TB.

17. Social Stigma Related to TB:

Many people with TB face social stigma and discrimination, which can stop them from seeking treatment.

- TB is often wrongly believed to be a disease of the poor or something to be ashamed of.
- It's important to educate the community that TB is treatable, and patients deserve support, not judgment.

Latent tuberculosis

Inactive or latent tuberculosis is the condition in which most people infected with the disease do not exhibit any symptoms.[4] The interferon-gamma release assay (IGRA) and the tuberculin skin test (TST) can identify this non-contagious condition; additional testing should be done to rule out active TB.[43] An estimated 5% to 15% of cases will develop into active TB throughout the course of the patient's lifetime if treatment is not received.[43]

There is a common misperception that tuberculosis is only a lung illness that causes coughing.[45] Although tuberculosis most often affects the lungs (pulmonary tuberculosis), it can infect many other organs.[5] Although extrapulmonary TB and pulmonary TB can coexist, extrapulmonary TB is the term for tuberculosis that develops outside of the lungs.[5]

Fever, chills, night sweats, appetite loss, weight loss, and exhaustion are examples of general symptoms.[5] In extreme situations, nail clubbing could also happen.[46]

The pulmonary

About 90% of the time, when a tuberculosis infection does become active, it affects the lungs.[10][47] Chest pain, a protracted cough with potentially bloody sputum, fatigue, fever, appetite loss, wasting, and general malaise are some of the symptoms.[10][48] Rarely, the infection could erode into a Rasmussen aneurysm or the pulmonary artery, causing severe hemorrhage.

Extrapulmonary

Article main: Tuberculosis outside the lungs

Other types of tuberculosis are caused by the infection spreading outside the lungs in 15–20% of active cases. All of these are referred to as extrapulmonary tuberculosis. Young children and those with compromised immune systems are more likely to develop extrapulmonary tuberculosis. This happens in over half of HIV-positive individuals. Among other notable extrapulmonary infection sites are the genitourinary system (in urogenital tuberculosis), the lymphatic system (in scrofula of the neck), the pleura (in tuberculous pleurisy), the central nervous system (in tuberculous meningitis), and the bones and joints (in Pott disease of the spine). Also referred to as military tuberculosis, "disseminated tuberculosis" is a common and potentially dangerous form of tuberculosis.Currently, 10% of extrapulmonary cases of TB are miliary.

Mycobacteria

Mycobacterium tuberculosis is the main article.

M. tuberculosis scanning electron micrograph A tiny, aerobic, nonmotile bacillus called Mycobacterium tuberculosis (MTB) is the primary cause of tuberculosis.[5] Compared to other bacteria, which typically divide in less than an hour, it divides slowly, every 16 to 20 hours.[56] The complex, lipid-rich cell envelope of mycobacteria contributes to their treatment resistance because of the strong barrier that the outer membrane's high lipid content provides.[57][58] Because of the high lipid and mycolic acid content of its cell wall, MTB either does not retain dye or stains very weakly "Grampositive" when a Gram stain is applied.[59] MTB can endure for weeks in a dry environment and resist weak disinfectants.

In conclusion

tuberculosis (TB) continues to rank among the most dangerous infectious diseases that people worldwide, particularly in developing nations, must deal with. Mycobacterium tuberculosis is the causative agent of tuberculosis (TB), which mainly affects the lungs but can also extend to the brain, bones, kidneys, and lymph nodes. When an infected individual coughs, sneezes, or speaks, the disease can spread via the air. This makes tuberculosis a public health concern, especially in places that are congested and have inadequate ventilation.

Despite being a serious medical condition, tuberculosis can be prevented and cured. Proper treatment and early diagnosis are two of the best ways to prevent tuberculosis. Individuals who have active tuberculosis must take a combination of antibiotics for six to nine months. To prevent complications and the emergence of drug-resistant TB strains, which are far more difficult and costly to treat, it is crucial to finish the entire course of treatment. Correct medication compliance is ensured by health programs such as DOTS (Directly Observed Treatment, Short-course).

Prevention techniques are just as important as treatment. Infants are frequently administered the Bacillus Calmette-Guérin (BCG) vaccine to guard against severe types of childhood tuberculosis. The risk of transmission can be considerably decreased by following easy steps like covering one's mouth when coughing, increasing ventilation in living areas, and avoiding close contact with TB patients who are actively ill. Frequent screening of those who have close contact with TB patients aids in the early detection of the illness and, if required, the initiation of preventative therapy.

Additionally, it is crucial to increase community knowledge about tuberculosis. Delays in obtaining medical attention are caused by the fact that many people are still ignorant about the disease's signs and risks. Public awareness efforts, health education, and community engagement can promote early medical intervention and lessen the stigma associated with tuberculosis.

To sum up, tuberculosis is a serious yet treatable illness. It is feasible to control and ultimately eradicate tuberculosis from society with the right information, early identification, thorough treatment, and preventative measures. To achieve a TB-free future, governments, healthcare professionals, families, and individuals must work together.

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