International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

A Review on Clinical Aspects of Antibiotics Therapy in Treatment of Tuberculosis

Mr. Nitin S. Chavan, Dr. D. K. Vir, Ms. Tejaswini N. Badar, Mr. Bhagwat N. Ghuge, Mr. Mayur K. Jadhav, Mr. Mahesh G Farkade ,

Department of pharmocology
Shree goraksh college of pharmacyand research center, khamgaon

Date of Submission: 25-11-2024 Date of Acceptance: 05-12-2024

ABSTRACT
The primary cause of tuberculosis (TB) in humans is Mycobacterium tuberculosis (M. tuberculosis), which causes hundreds of thousands of deaths and millions of infections globally. The community bears a heavy financial burden as a result. Bovine TB, commonly referred to as zoonotic TB, is caused by Mycobacterium Bovis, which infects cattle in contrast to M. tuberculosis. By handling ill animals, consuming unpasteurized dairy products, and being exposed at work, people can get zoonotic tuberculosis. In Nepal, there is little awareness of the link between zoonotic tuberculosis in humans and cattle. According to the study, exposure to infected cattle is one of the risk factors that lead to the development of tuberculosis in humans in Nepal. There are both human and animal participants in the study. To begin with, a retrospective matched case-control investigation was carried out at the National Tuberculosis Centre for Tuberculosis (NTC), Bhaktapur, Nepal. Interviews were conducted with 290 individuals (equal numbers of TB cases and control participants) to gather data on occupational, behavioural, and sociodemographic hazards, including exposure history associated to cattle. Second, cross-sectional research was conducted among the cattle that belonged to the patients who had been diagnosed with tuberculosis. To identify M. Bovis infection in cattle, ELISA, fast antibody testing, and comparative tuberculin skin testing were employed concurrently. Human TB development risk variables included history of cattle exposures (OR = 3.9, 95% CI: 2.1–7.4, p = 0.001), prior history of TB (OR = 7.9, 95% CI: 3.0–20.6, p < 0.001), and smoking (OR = 4.6, 95% CI: 2.1–10.0, p < 0.001). Twelve animals (9.76%, 95% CI: 5.37–16.76, p < 0.0001) out of the 123 cattle sampledELISA test, 7 (5.7%, 95% CI: 2.52–11.80, p < 0.0001), and 46 (37.4%, 95% CI: 28.97–46.62, p = 0.007) were found to be positive by the tuberculin test. There was a high degree of inter-test agreement between the ELISA and tuberculin (κ = 0.72, 95% CI: 0.48–0.95, p < 0.01). According to this study, human TB can develop as a result of exposure to infected cattle as well as sociodemographic risk factors.

I. INTRODUCTION

The bacterium Mycobacterium tubercula (M. tubercula) is the cause of tuberculosis (TB), an airborne illness (Figure 2.13. M. The M. tuberculous complex is made up of bercings and seven closely related mycobacterial species: M. mieri, M. caprar, M. pinnipedis, M. canenti, A. wung, and M. Mafrican. Human sickness has been linked to the majority of these species, but not all of them. M. berd is the primary cause of tuberculosis cases in the United States. Another name for Morgans is tubercle bacilli. M. tuberculosis spreads by airborne particles termed droplet nuclei, which have a diameter of 1–5 microns. When people with pulmonary or laryngeal T di cough, inece, shit, or sing, infection droplet nuclei are produced. These microscopic particles, depending on the surroundings Instead of coming into touch with a surface, a bervalour is spread through the air. When someone inhales droplet nuclei carrying M., the droplet nuclei travel via the mouth or nasal passages, upper respiratory tract, and bounce to get to M. This is known as trammision. Droplet nuclei, which are airborne particles with a diameter of 1–5 microns, are the carriers of TB. When people with pulmonary or laryngeal tuberculosis cough, sneeze, yell, or sing, infectious droplet nuclei are produced.

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

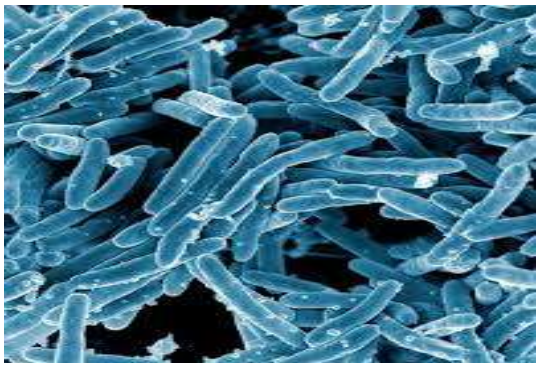


Figure: Mycobacterium tuberculosis

TB is spread by airborne particles known as droplet nuclei, which have a diameter of 1–5 microns. When people with pulmonary or laryngeal T di cough, inece, shit, or sing, infection droplet nuclei are produced. These microscopic particles can float in the atmosphere for several hours, depending on the circumstances. Instead of coming into touch with a surface, a bervalour is spread through the air. When someone inhales droplet nuclei carrying M., the droplet nuclei travel via the mouth or nasal passages, upper respiratory tract, and bounce to get to M. This is known as trammision. Droplet nuclei, which are airborne particles with a diameter of 1–5 microns, are the carriers of TB. When people with pulmonary or laryngeal tuberculosis cough, sneeze, yell, or sing, infectious droplet nuclei are produced.

History

In 1939, soil scientist Selman Waksman was employed at Rutgers University's New Brunswick Department of Microbiology at the New Jersey Agricultural Experiment Station. He investigated the interactions between soil bacteria. Throughout the last 25 years, Waksman, his assistants, and a few graduate students have gathered and disseminated knowledge about fungus as well as the strategies and tactics they employed to do so. He researched the actinomycetes in addition to fungi. A class of microorganisms known as actinomycetes can be thought of as a bridge between fungus and bacteria. In the history of TB medications, actinomycetes—which are displayed on an agar plate—have played a crucial role. In his earlier research on the soil's microbiological impact, Waksman had discovered found some soil bacteria might be affected by actinomycetes in a rather strange way, which restricted their development. He subsequently focused on examining the TB organism's susceptibility to different actinomycetes rather than just researching the soil. Beginning in 1939, he conducted a methodical search for soil microorganisms that could stop the growth of germs that cause sickness. Despite being very hazardous, actinomycin was isolated in 1940 as a result of several early investigations into the actinomycetes' ability to produce antibiotics.

Five Two years later, streptothricin was discovered to be substantial toxicity as well. As the search continued, streptomycin, a different chemical, was discovered in September 1943 that was less poisonous to animals, but otherwise had certain characteristics. In a study published in January 1944, the antibiotic's isolation was first made public.

Its ability to combat the TB organism was shown before the year ended. It had undergone a great deal of investigation within two years after its isolation date. Drs. W H Feldman and H Corin Hinshaw of the Mayo Clinic were quickly drawn to the news that streptomycin was effective against the TB bacterium. Finding antituberculosis drugs to try on experimental animals piqued their curiosity.

Dr. Wakman consented to give some of the unrefined streptomycin formulation to the Mayo Clinic. He also made arrangements for the Merck, a chemical and pharmaceutical business, to manufacture a significant amount of streptomycin, which would be necessary for more thorough testing. In the winter of 1944–1945, the Mayo Clinic performed the first streptomycin-based clinical treatments for tuberculosis. The first-time streptomycin was given to a human person to treat TB occurred on November 20, 1944. Only a few weeks had passed since the first patient received PAS treatment. On July 13, 1947, the patient was released from the sanatorium with a diagnosis of pulmonary TB that appeared to have been arrested. However, there were some significant restrictions on the usage of streptomycin. Among these were the requirement for an uncomfortable injection and the emergence during prolonged treatment of There was opposition. Additionally, there was a specific toxicity of the medication that caused some patients to lose their sense of balance or hearing. But streptomycin was so popular that, by 1949—just five years after the drug's isolation—there was 1,800 references in the literature that detailed research findings in several languages and nations.

Ethology

The main emphasis of ethological theory is behaviour and how it might alter in order to

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

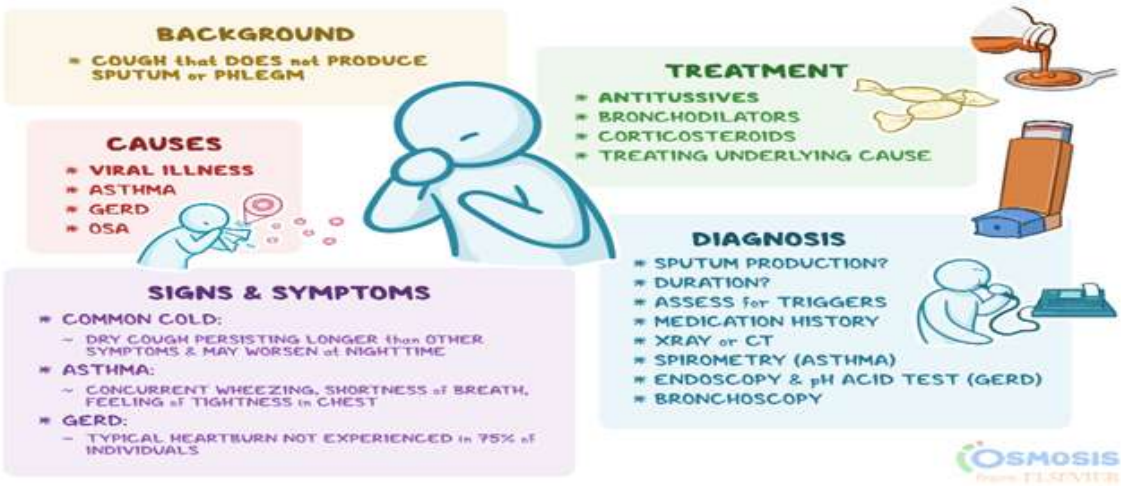
survive. By arguing that behavioral features are both biological and hereditary, Darwin's ideas of evolution shed light on the mystery of behaviour.

Pathology

This section will discuss the various stages of Mycobacterium TB infection. Beginning with inhalation, the innate and adaptive immune responses, and the dual function of tuberculoma development in preventing infection while simultaneously creating a favourable environment for bacilli to thrive and proliferate. The function of Tumour Necrosis Factor alpha (TNF-α) in the maintenance of tuberculoma and its genetic regulation is more complicated than previously believed, according to recent studies.

#Symptomes of Tuberculosis

1 Coughing for three or more weeks



COUGHING OF SYMPOMS

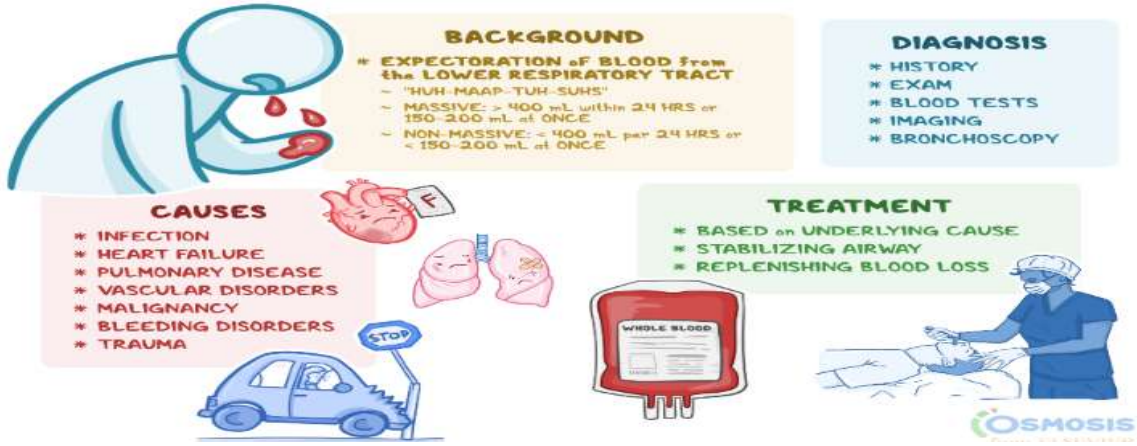
The most frequent reasons of a persistent cough include acid reflux, postnasal drip, asthma, and tobacco use, however it can occasionally be challenging to identify the exact issue. Fortunately, if the underlying issue is addressed, persistent cough usually goes away.

A cough is your body's natural way of expelling mucus and irritating substances like smoke or dust from your airways. Rarely does it indicate a significant problem.

The majority of coughs go away in three weeks and don't require medical attention.

A dry cough is one that is itchy and produces no phlegm. A chesty cough indicates that your airways are being cleared by the production of phlegm.

2. Coughing up blood or mucus



COUGHING UP BLOOD

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

A chest infection is the most frequent cause of blood in the cough. The most frequent causes, when identified, are as follows: Pneumonia is characterized by swelling (inflammation) of the tissue in one or both lungs, typically brought on by a bacterial or viral infection. Coughing up blood is sometimes misinterpreted as a sign of a serious illness, including lung cancer. This symptom, however, can be caused by a variety of diseases, the most of which are curable. For instance, blood-streaked sputum from a smoker's persistent cough does not always indicate lung cancer. Exposure to smoking can produce haemoptysis from a variety of reasons, including bronchitis or inflammation of the throat.

3. Chest pain, or pain with breathing or coughing

CHEST PAIN

Numerous conditions, such as musculoskeletal disorders, gastrointestinal disorders, or even referred pain from organs like the liver or gallbladder, can induce right-side chest discomfort. For an accurate diagnosis and course of treatment, it's important to take into account related symptoms like breathing problems or radiating pain and speak with a healthcare provider.

Chest discomfort on the right side is typically caused by the lungs not working properly. One experiences agony from the circumstance, such as a tightness or crushing heaviness in the chest. When the person in pain engages in a physically demanding activity, it gets worse.

4. Unintentional weight loss

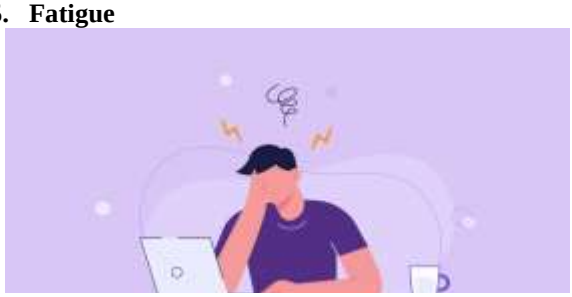
weight loss

The unintended loss of at least 5% of body weight during a six- to 12-month period is referred to as unexplained weight loss. Two This would result in a 200-pound guy dropping 10 pounds, or a 130-pound woman losing 6 to 7 pounds.

Unintentional weight reduction happens when there is no conscious effort to reduce weight, such as when you start exercising or reduce your caloric intake.

Though it can happen to anybody, persons over 65 are more likely to have unexplained weight loss. The annual rate of inadvertent weight loss in elderly persons is around 13%.

5. Fatigue



Fatigue

• Headaches.
• Sudden, intense exhaustion that last for a long time.
• Brain fog and trouble focusing Memory issues; mood swings; low-grade fever and chills; sore throat; enlarged lymph nodes in the neck or armpits; joint and muscle pains; and sleep issues (such as waking up many times during the night and having trouble falling back asleep)
• Having trouble falling asleep, even after getting adequate sleep.
• Experiencing light-headedness or vertigo while moving from a seated to an upright posture.

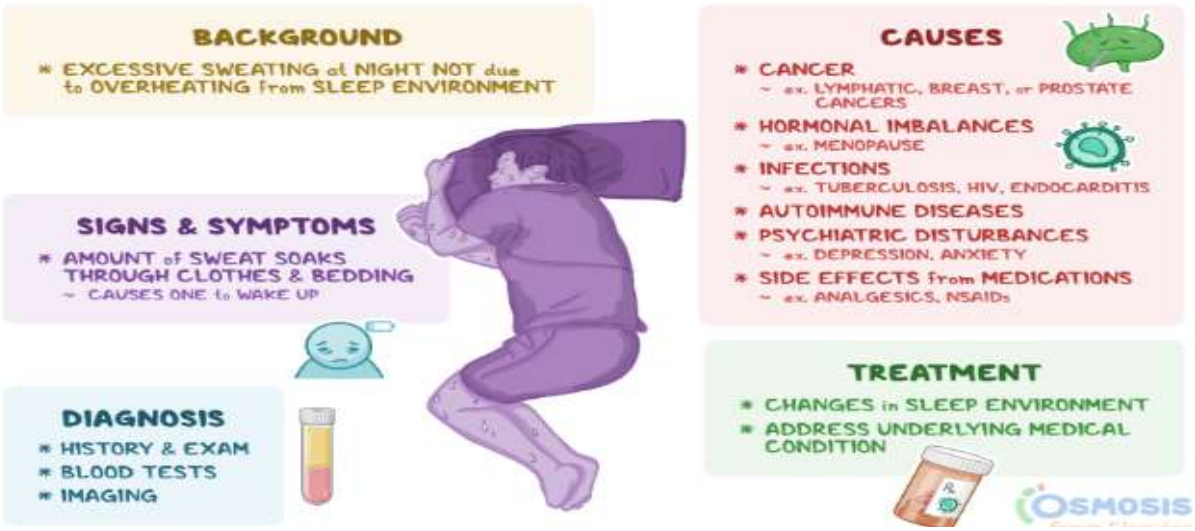
6. Fever

FEVER

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

• Infections: Colds, the flu, urinary tract infections, and respiratory infections are among the bacterial or viral illnesses that frequently cause fever.
• Inflammatory Conditions: Fever can be brought on by inflammation brought on by diseases including inflammatory bowel disease, rheumatoid fever, or arthritis.
• Drugs: Drug-induced fever is a possible adverse effect of various drugs, including antibiotics.
• Heat Exhaustion or Heatstroke: Fever can result from prolonged exposure to high temperatures or from vigorous physical exertion in hot conditions.
• Immunizations: As the body reacts to some immunizations, a little fever may develop.
• Autoimmune Disorders: Frequent or chronic fever can be a symptom of autoimmune diseases such as lupus or rheumatoid arthritis.
• Cancer: Fever is a sign of several malignancies, particularly blood-related ones like leukemia or lymphoma.
• Additional Causes: Stress, hormonal fluctuations, tissue damage, and a few uncommon hereditary conditions can also cause fever.

7. Night sweats



Night sweats

Excessive perspiration throughout the night is referred to as night sweats or sleep hyperhidrosis. Abnormal sweating that is not caused by an overheated sleeping environment—such as warm weather, wearing too much clothing, or using too many blankets—is referred to by this phrase. Sweat is commonly described as "drenching" since it usually percolates through clothing and bedding. In general, night sweats are linked to an underlying medical issue, particularly if they interfere with sleep and happen frequently. Night sweats may prompt a person to seek medical attention, particularly if they are accompanied by other symptoms including fever, cough, discomfort, diarrhea, or inadvertent weight loss. Excessive perspiration at night, which frequently wakes one up, is the typical sign of night sweats. The person can say that their sheets and clothing are covered in perspiration. There may be other indications or symptoms depending on what is causing the night sweats. For instance, people with underlying lymphoma may also have fever, widespread pruritus or itching, enlarged lymph nodes that manifest as painless lumps, typically in the neck, armpit, or groin, and unexplained weight loss. Breast cancer is linked to changes in the look of the skin of the breast or a lump or tumor in the breast. Other symptoms include difficulty peeing or frequent urination if the cause of the night sweats is underlying prostate cancer.

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

8. Chills

Chills

Your body's reaction to perceived dangers that might seem normal to others is anxiety. Extreme and ongoing anxiety, concern, or uneasiness about everyday events are frequently characteristics of the illness. Anxiety disorder sufferers may worry excessively and continuously about missing a flight, arriving late to work, becoming sick, or even passing away. Anxiety's physical manifestations include

- Feelings of chills and cold
- Trembling and chilling
- Breathing difficulties
- Sweating excessively
- Prolonged exhaustion
- Tension in muscles
- Dry mouth and irregular pulse
- Issues with sleep
- An irregular pulse
- Issues with sleep

9. Loss of appetite

Loss of appetite

The need to satisfy your body's demands for energy to carry out your everyday tasks is known as appetite. Hunger, satiation, and satiety are the three parts of appetite.

The hunger process is a complicated response. The brain, digestive system, endocrine system, and sensory nerves all regulate hunger.

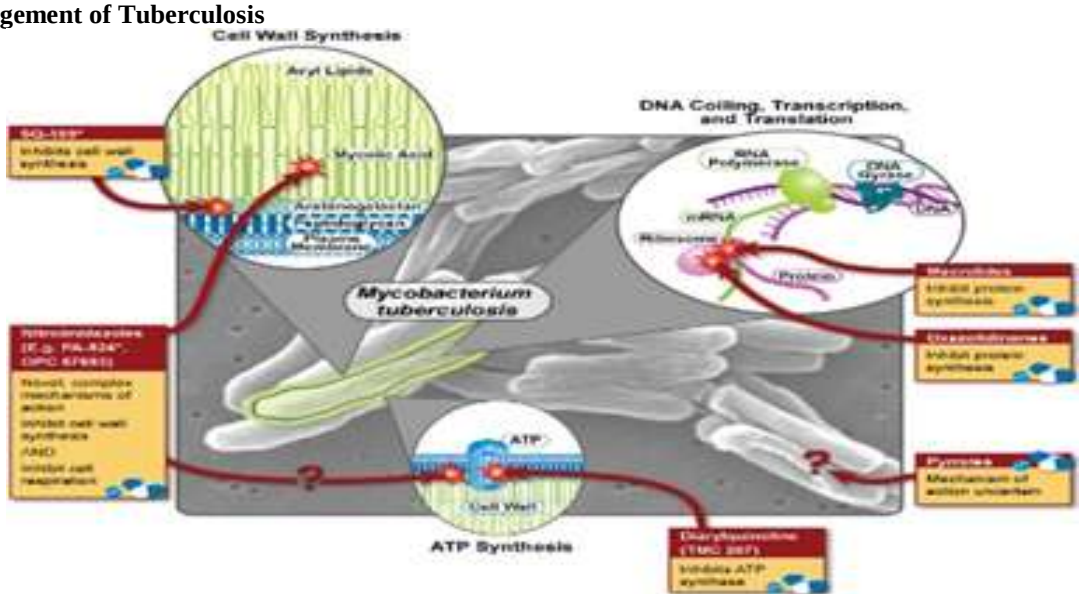
An appetite can be triggered by a variety of causes. When your favorite cuisine or a delicious

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

delicacy that entices your taste senses is in the air. The food's color that makes you want to eat. Certain meals might make you feel hungry even when you're not.

A person's eating habits are also significantly influenced by their mood. When people are pleased or depressed, they eat. When they are pleased, some people eat dessert, while others choose junk food. meals to lift their spirits while they're feeling down. And when they're depressed, some people skip meals.

Management of Tuberculosis



Management of Tuberculosis

The term "management of tuberculosis" refers to methods and strategies used to treat tuberculosis (TB), or simply a TB treatment strategy.

A short-term course of therapy consisting of isoniazid, rifampicin (sometimes called Rifampin), pyrazinamide, and ethambutol for the first two months is the medical standard for active TB. Isoniazid and pyridoxal phosphate are given together during this early phase to prevent peripheral neuropathy. For the final four months of therapy, isoniazid and rifampicin are administered together (6–8 months for miliary TB). After six months of treatment for pulmonary TB or eight to ten months for miliary TB, a patient should be rid of all viable TB germs. [Reference required] Isoniazid is used to treat latent tuberculosis or latent tuberculosis infection (LTBI) for three to nine months by itself. Hepatotoxicity is frequently a danger of this prolonged therapy. It has been demonstrated that taking isoniazid and rifampicin together for three to four months is an equally effective way to treat LTBI while lowering the risk of hepatotoxicity. In order to stop active TB from spreading, LTBI must be treated.

Making a diagnosis Your doctor will examine you and use a stethoscope to listen to your breathing in order to diagnose a tuberculosis (TB) infection.

• Examining the lymph nodes for swelling.
• Querying you regarding your symptoms.

TB examinations

If your physician suspects tuberculosis, they will prescribe testing.

• It's likely that you came into contact with someone who has active tuberculosis (TB).
•You are at risk for active tuberculosis.

Skin examination

On the inside of one forearm, a little dose of a drug known as tuberculin is injected just beneath the skin. A medical professional will examine your arm for swelling at the injection site within 48 to 72 hours. A positive or negative test result is determined by the size of the raised skin.

This test determines if your immune system responds to TB or has produced an antibody against it. You most likely have either an active TB illness or a latent TB infection if your test results are positive. Even if they are not infected, those

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

who had a TB vaccine may have a positive test result. If the test is negative, it indicates that your body did not respond to it. That does not imply that you are infection-free.

Government policies for prevention and control of T.B.

The management and regulation of psychoactive chemicals, sometimes known as drugs, especially those that are addictive or lead to physical and mental dependency, is the subject of a drug policy. Although governments often enact drug policies, organizations at all levels—from international organizations to local or national governments, administrations, or public spaces—may have their own drug-related rules. Drug policies often target the supply and demand for drugs, reduce the negative effects of drug use, and offer medical support and treatment in order to combat drug addiction or dependence. Voluntary treatment, rehabilitation, substitution therapy, overdose management, alternatives to jail for drug-related minor offenses, medicine prescriptions, awareness campaigns, community social services, and family assistance are all examples of demand reduction strategies.Measures like implementing foreign policies to stop the international production of plants used to create drugs and to stop drug trafficking, as well as imposing fines and jail time on those found guilty of drug charges, are examples of supply side reduction. Drug replacement programs, needle syringe programs, and free facilities for checking the purity of drugs are some of the policies that assist lessen the risks associated with drug use. The idea of "drugs" as a controlled substance differs from one jurisdiction to the next. Heroin, for instance, is controlled virtually everywhere, whereas other narcotics, like alcohol, codeine, or khat, are only regulated in some locations. Prescription medications, which are not deemed harmful but are only available to those with a valid prescription, are likewise regulated in the majority of jurisdictions.

The Communicable Disease Centre moved to its current headquarters in 1960. Building 1 is pictured in 1963.

In the year 1960, the Communicable Disease Center relocated to its present location. Pictured in 1963 is Building 1.

The Epidemic Intelligence Service (EIS) was established in 1951 as a two-year postgraduate epidemiology training program in response to Chief Epidemiologist Alexander Langmuir's concerns about possible biological weapons during the Korean War. More than 18,000 disease detectives in more than 80 countries were trained by the Field Epidemiology Training Programs (FETP), which was established in 1980 as a result of the EIS program's success. The 40th anniversary of the CDC's funding of Thailand's Field Epidemiology Training Program was commemorated by FETP in 2020. Thailand was the first FETP site established outside of North America, and it is now present in many other nations, demonstrating the CDC's global importance in advancing this paradigm. The Epidemiology Training Programs and 950 students have graduated from the Public Health Interventions Network (TEPHINET).

Headquarters and Emergency Operations Center for Arlen Specter

The CDC headquarters' land was acquired by the city of Atlanta on January 1, 2018, marking the largest annexation in the city's history. The decision was made by the Atlanta City Council in December of last year. In order to expand MARTA across the Emory campus using city tax monies, the CDC and Emory University had asked the Atlanta city government to annex the land.[26] The headquarters were situated at a statistically selected location for the Druid Hills census, which was an unorganized region.

In response to errors made during the COVID-19 epidemic, Dr. Walensky announced on August 17, 2022, that the CDC will undergo significant adjustments. She described a revision to the CDC's data analysis and dissemination procedures and how theyIt would provide information to the public. "CDC and public health have been preparing for COVID-19 for 75 years, and in our big moment, our performance did not reliably meet

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 582-591 www.ijprajournal.com ISSN: 2456-4494

expectations," she wrote in a message addressed to all CDC staff.

II. CONCLUSION

There is still need for improvement in the therapeutic treatment of drug-resistant and drug-susceptible strains. Long length, inconsistent effectiveness, safety, acceptability, and a meaningful pill load are characteristics of the existing regimens.

The total rate of treatment success is lower than the 85% WHO-recommended percentage, which leads to an increase in medication resistance. A poor percentage of multidrug-resistant patients are now recognized and treated, according to estimates from the World Health Organization. Of the cases of multidrug-resistant TB that were identified in 2010, 48% were effectively cured. According to the WHO, only 34 nations achieved a treatment success rate of at least 75%. Treatment success rates for multidrug-resistant patients are less than 50%, even in TB reference facilities.

Despite the new medications' adherence, effectiveness, safety, and tolerability profile (delamanid and bed aquiline, especially) seem promising, but as of right now, we are unable to forecast their long-term effectiveness or how affordable it would be to employ them in environments with limited resources.

To determine the new medications' potential and have a better understanding of how to employ them in combination regimens, more study is required.

REFERENCE

[1]. Gohlmann HW, Neefs JM, Winkler H, Van Gestel J, Andries K, Verhasselt P, Guillemont J, Timmerman P, Zhu M, Lee E, et al. 2005. a diarylquinoline medication that inhibits Mycobacterium tuberculosis's ATP synthase.

[2]. Stuitje AR, Slabas AR, Hawkes TR, Rice DW, Rafferty JB, Sedelnikova SE, Baker PJ, and Baldock C. 1996. a pharmacological action mechanism identified by enoyl reductase structural investigations.

[3]. Jacobs WR Jr., Wilson T, Collins D, de Lisle G, Balasubramanian V, Um KS, Banerjee A, Dubnau E, Quemard A, and Jacobs 1994. Mycobacterium tuberculosis's inhale gene codes for a target for isoniazid and ethionamide.

[4]. Koch-Weser D, Ebert RH, Barclay WR. 1954. Isoniazid's mode of action. II.

[5]. Barry CE. 2011. Insights from 70 years of developing antituberculosis medications.

[6]. Belisle JT, Brennan PJ, Mikusova K, Belanger AE, Besra GS, Ford ME, and Inamine JM. 1996. Ethambutol, an antimycobacterial medication, targets an arabinosyl transferase involved in cell wall arabinan biosynthesis that is encoded by the embAB genes of Mycobacterium avium.

[7]. Blanchard JS. 1996. Drug resistance in Mycobacterium tuberculosis: Molecular mechanisms.

[8]. Woodward KT, Boone IU. 1953. Pyridoxine and its derivatives' connection to isoniazid's mode of action.

[9]. Mizrahi V., Boshoff HI. 2000. Mycobacterium tuberculosis that expresses Mycobacterium smegmatis pyrazinamidase is hypersensitive to pyrazinamide and similar amides. ruber T. (2013). Mycobacterium TB uses para-aminosalicylic acid as an alternate substrate for folate metabolism. 88–91 in science 339.

[10]. [Free article from PMC] [Med] [Google Scholar]

[11]. 1945's Chorine V. The effect of nicotine amide on mycobcaterium-type bacteria.

[12]. Borisov AS, Shang N, Gordin F, Bliven-Sizemore E, Sterling TR, Villarino ME, et al. (December 2011). "Three months of rifapentine and isoniazid for latent tuberculosis infection". 365 (23):215566, The New England Journal of Medicine.

[13]. Leap to: a b World Health Organization, 2014. recommendations for treating latent TB infection. WHO stands for World Health Organization. WHO/HTM/TB/2015.01; hdl:10665/136471. ISBN 978-92-4-154890-8. On June 5, 2015, the original content was archived.

[14]. World Health Organization (2015). Appendix to the Guidelines for the Management of Latent Tuberculosis Infection: Evidence to Decision Framework. WHO stands for World Health Organization.

[15]. Aithal, Guruprasad P.; Ramappa, Vidyasagar (2013). "Hepatotoxicity Related to Anti-tuberculosis Drugs:

Mechanisms and Management". Clinical and Experimental Hepatology Journal, 3

[16]. Wang JY, Hsueh PR, Jan IS, Lee LN, Liaw YS, Yang PC, Luh KT (October 2006). "Empirical treatment with a fluoroquinolone delays the treatment for tuberculosis and is associated with a poor prognosis in endemic areas". Thorax

[17]. Aktas E, Durmaz R, Yang D, Yang Z (2005). "Molecular characterization of isoniazid and rifampin resistance of Mycobacterium tuberculosis clinical isolates from Malatya, Turkey". Microbial Drug Resistance.

[18]. Reljic R (May 2007). "IFN-gamma therapy of tuberculosis and related infections". Journal of Interferon & Cytokine Research.

[19]. Leimane V, Riekstina V, Holtz TH, Zarovska E, Skripconoka V, Thorpe LE, et al. (2005). "Clinical outcome of individualised treatment of multidrug-resistant tuberculosis in Latvia: a retrospective cohort study

[20]. Dye C, Watt CJ, Bleed DM, Williams BG (2003). "What is the limit to case detection under the DOTS strategy for tuberculosis control