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Review On Pathological Study And Treatment Of Tuberculosis

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Abstract

Tuberculosis (TB) is a chronic inflammatory disease caused by the pathogenic bacterium Mycobacterium tuberculosis. It is a major global health problem, and is the leading cause of death from a single infectious agent. The pathology of TB is characterized by the formation of granulomas, which are collections of immune cells that form around the bacteria. Granulomas are designed to contain and kill the bacteria, but they can also damage the surrounding tissue. The pathological study of TB is important for understanding the pathogenesis of the disease, developing new diagnostic tools and treatments, and monitoring the effectiveness of existing interventions. Recent advances in the pathological study of TB have led to a better understanding of the disease and its progression. For example, researchers have identified new types of granulomas that are associated with different clinical outcomes. Additionally, studies have shown that M. tuberculosis can subvert the host immune response by manipulating the function of dendritic cells and macrophages. The pathological study of TB is an essential component of the global effort to control and eliminate the disease. By understanding the pathology of TB, we can develop more effective diagnostic tools, treatments, and vaccines. Better ways to diagnose, treat, and prevent this deadly disease

Keyword:- tuberculosis, pathophysiology of TB diagnosis, Epidemiology, treatment

1. Introduction:-

The pathological study of tuberculosis (TB) is the study of the changes that occur in the body when infected with the bacterium Mycobacterium tuberculosis. TB is a chronic infectious disease that can affect any organ in the body, but it most commonly affects the lungs.

The pathological changes in TB are caused by the interaction between the bacteria and the host immune system. The bacteria are able to survive and multiply in the body, even in the presence of a strong immune response. This is because the bacteria have developed a number of mechanisms to evade the immune system.

The immune system responds to the bacteria by forming granulomas. Granulomas are collections of immune cells and dead bacteria that form around the site of infection. Granulomas are the hallmark of TB pathology.

The pathological changes in TB can vary depending on the stage of the disease and the organ system involved. In the early stages of TB infection, the pathological findings may be limited to a few small granulomas. As the disease progresses, the granulomas can become larger and more widespread. They can also break down, releasing bacteria into the surrounding tissue. This can lead to the formation of cavities and other complications.

The pathological changes in TB can also be affected by the patient's immune system. Patients with weakened immune systems are more likely to develop severe TB and more extensive pathological changes.

What is tuberculosis

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. (The related bacteria M. tuberculosis, M. bovis, M. africanus, M. microti, and M. Canetti.). Tuberculosis typically attacks the lungs, but can also affect other parts of the body. The disease has become rare in high income countries, but is still a major public health problem in low- and middle-income countries.

All mycobacteria are classical acid-fast organisms and are named so because of the stains used in evaluation of tissue or sputum specimens.

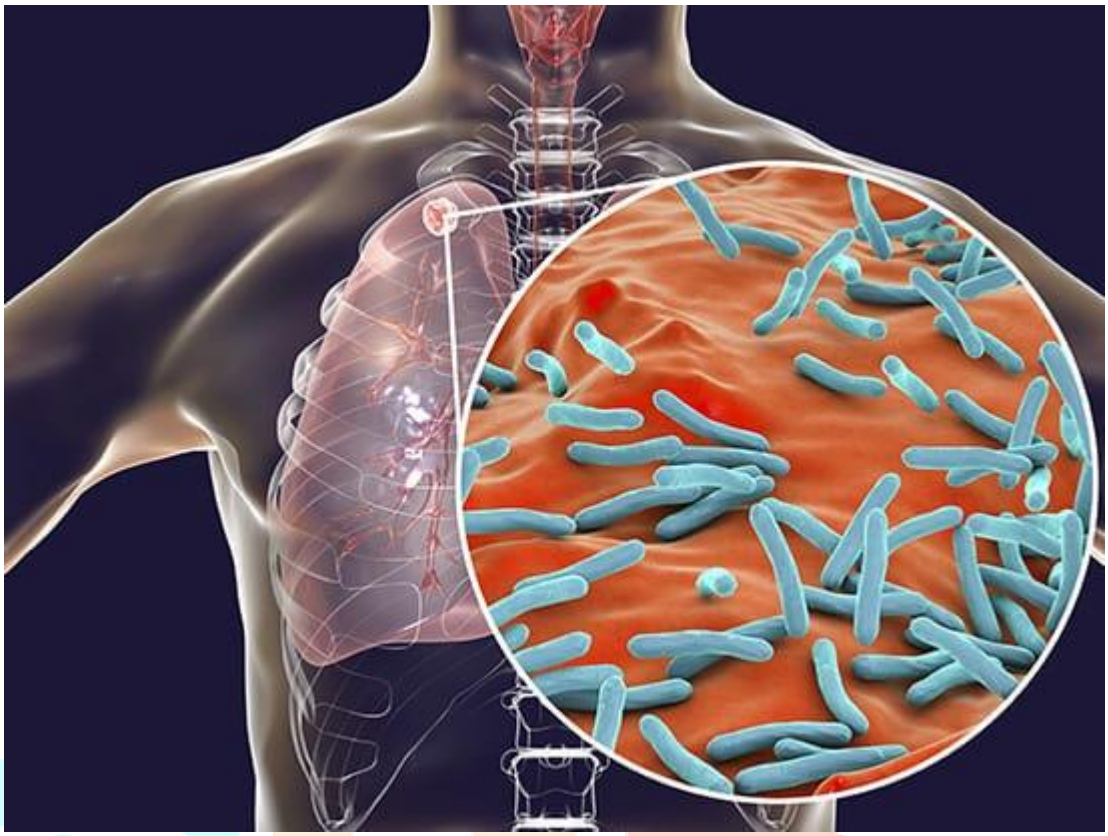

Fig no: 1. Tuberculosis virus

History

Tuberculosis has existed since antiquity. The oldest unambiguously detected M. tuberculosis gives evidence of the disease in the remains of bison in Wyoming dated to around 17,000 years ago. However, whether tuberculosis originated in bovines, then transferred to humans, or whether both bovine and human tuberculosis diverged from a common ancestor, remains unclear. A comparison of the genes of M. tuberculosis complex (MTBC) in humans to MTBC in animals suggests humans did not acquire MTBC from animals during animal domestication, as researchers previously believed. Both strains of the tuberculosis bacteria share a common ancestor, which could have infected humans even before the Neolithic Revolution. Skeletal remains show some prehistoric humans (4000 BC) had TB, and researchers have found tubercular decay in the spines of Egyptian mummies dating from 3000 to 2400 BC. Genetic studies suggest the presence of TB in the Americas from about AD 100 (16).

2. Transmission

Tuberculosis (TB) is a contagious airborne disease caused by the bacterium Mycobacterium tuberculosis. It is spread through the air when a person with active TB disease of the lungs or throat coughs, sneezes, speaks, or sings. People nearby may breathe in these bacteria and become infected.

TB is not spread through contact with contaminated surfaces or objects. It is also not spread through casual contact, such as shaking hands or hugging.

To be infected with TB, you need to breathe in a large number of TB bacteria. This is more likely to happen if you are in close contact with a person with active TB disease for a long period of time.

People with weakened immune systems, such as people with HIV/AIDS, cancer, or diabetes, are more likely to develop TB if they are exposed to the bacteria.

Symptoms of TB can develop anywhere from a few weeks to several months after exposure to the bacteria.

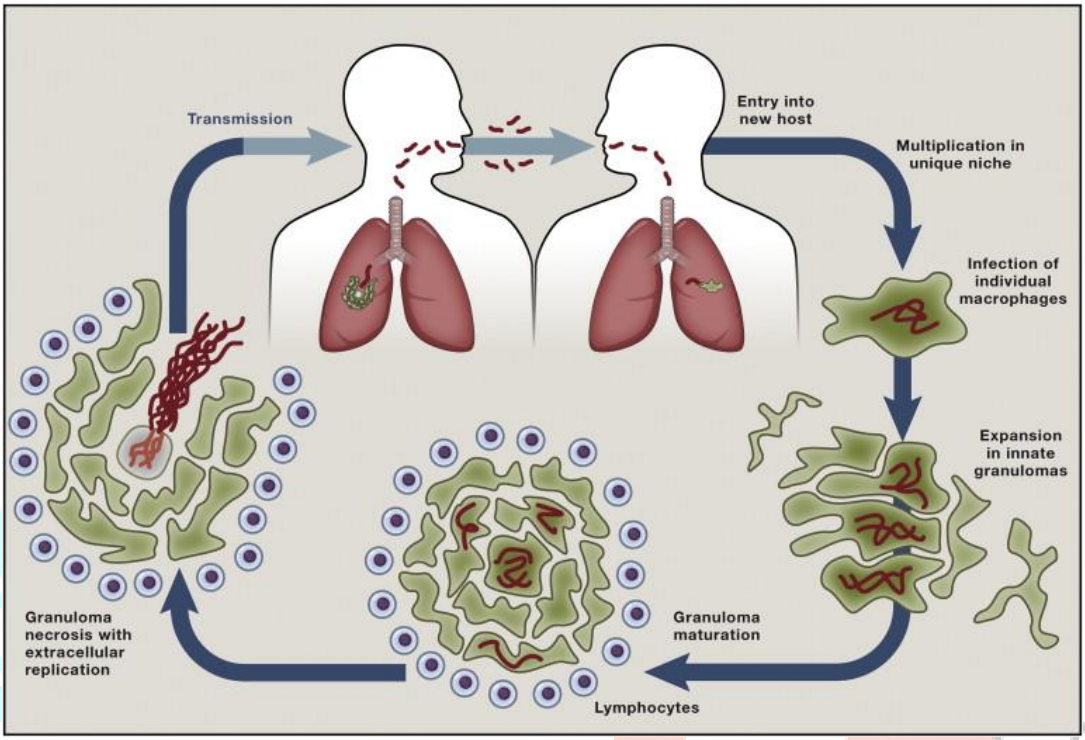

Fig .1 transmission of TB

3. Symptoms

- Cough that produces sputum (mucus) that may be bloody
- Chest pain
- Shortness of breath
- Fatigue
- Weight loss
- Night sweats

Epidemiology:-

Tuberculosis is one of India's major public health problems. According to World Health Organization (WHO) estimates, India has the world's largest tuberculosis epidemic.[5] In 2020, India accounted for 26% of the incident TB cases across the globe. India has incidence rate of 192 cases per 100,000 of population. India accounted for 38% of global TB deaths among HIV-negative people and for 34% of the combined total number of TB deaths in HIV-negative and HIV-positive people. Further in 2020, India accounted for 24% of global gap between estimated TB incidence and the number of people newly diagnosed with TB and reported.[6] Many research studies have investigated the effects and consequences of TDR-TB, especially in India, where social and economic development is still in

progress. A report by Zarir Udwadia, originating from studies at the Hinduja Hospital in Mumbai, discusses the drug-resistant effects and results.[7] An experiment was conducted in January 2012 on four patients to test how resistant and unique the "new category" of TDR-TB is. These patients were given all the first-line drugs and second-line drugs that usually are prescribed to treat tuberculosis, and were resistant to all. As a response, the government of India appeared to stay in denial, while the WHO decided that although patterns of drug-resistance were evident, there was insufficient evidence to create a new category of TDR-TB from these results.

- Compared to India, Canada has about 1,600 new cases of TB every year.[9] Citing studies of TB-drug sales, the government of India now suggests the total has gone from being 2.2 million to 2.6 million people nationwide.[10] On March 24, 2019, TB Day, the Ministry of Health & Family Welfare of India notified that 2.15 million new tuberculosis patients were discovered only in 2018.
- In India, tuberculosis is responsible for the death of every third AIDS patient. Moreover, India accounts for about a quarter of the global tuberculosis burden. The ministry reiterated their commitment to eliminating tuberculosis in the country by 2025. As part of its efforts to eliminate tuberculosis, the Union Government changed the name of Revised National Tuberculosis Control Program (RNTCP) to National Tuberculosis Elimination Program (NTEP) on December 30, 2019. [9-10-11]

4. Treatment

TB is a serious disease, but it is treatable with a combination of antibiotics. The duration of treatment depends on the severity of the disease and the patient's response to treatment.

For most people with TB, treatment will last for 6 to 9 months. However, some people with more severe TB may need to be treated for longer periods of time.

The most common antibiotics used to treat TB include isoniazid, rifampin, pyrazinamide, and ethambutol. These antibiotics are taken together for the first 2 months of treatment, and then isoniazid and rifampin are continued for the remaining 4 to 7 months of treatment.

It is important to take all of your medications as prescribed by your doctor. This will help to cure the infection and prevent the spread of the disease.

Some people with TB may also need to take other medications, such as corticosteroids, to help manage their symptoms. Corticosteroids can help to reduce inflammation and swelling in the lungs.

If you are pregnant or breastfeeding, you may need to take different antibiotics than the ones listed above. Your doctor will be able to advise you on the best treatment for you.

It is important to note that TB can be a serious disease, but it is treatable with antibiotics. If you have TB, it is important to follow your doctor's instructions carefully and take all of your medications as prescribed.

Here are some additional tips for taking your TB medications:

Be sure to talk to your doctor about any other medications you are taking, including over-the-counter medications and herbal supplements. Some medications can interact with TB medications and make them less effective.

If you have any side effects from your TB medications, be sure to talk to your doctor. There may be ways to manage the side effects or switch to different medications.

By following these tips, you can help to ensure that you take your TB medications correctly and effectively.

:- Those are drug use in treatment TB

GROUP 1 Fist line oral agents	Isoniazid Rifampicin Pyrazinamide Ethambutan Rifabutin
GROUP 2 Injectable agent	Streptomycin Amikacin Kanamycin Capreomycin
GROUP 3 Fluoroquinolones (FQs) GROUP 4 Oral bacteriostatic second – line anti tb drug	Moxifloxacin Levofloxacin ofloxacin Ethionamide Prothionamide Cycloserine Para-amino salicylic acid
GROUP 5 Drug with limited data on efficacy and or long term safety in the treatment of DR- TB	Bedaquline Linezolide clofazimine Amoxicillin Isoniazid high dose thioacetazone

Table no: 1 Drug group abbreviation

Herbal treatment.

Herbal treatment of tuberculosis (TB) has been used for centuries in many different cultures. Some herbs have been shown to have anti-tuberculosis properties in laboratory studies, but more research is needed to confirm their efficacy and safety in humans.[7]

Here are some of the herbs that have been studied for their potential use in the treatment of TB:

Garlic: Garlic contains a compound called allicin, which has been shown to have antibacterial activity against Mycobacterium tuberculosis, the bacteria that causes TB.[8]

Goldenrod: Goldenrod contains a compound called quercetin, which has anti-inflammatory and antioxidant properties. Quercetin has also been shown to inhibit the growth of Mycobacterium tuberculosis in laboratory studies.

Horsetail: Horsetail contains a compound called silica, which has been shown to boost the immune system and help fight infection. Silica has also been shown to have anti-tuberculosis activity in laboratory studies.[19]

Barberry: Barberry contains a compound called berberine, which has anti-inflammatory and antimicrobial properties. Berberine has also been shown to have anti-tuberculosis activity in laboratory studies.[16]

Andrographis paniculate: Andrographis paniculate is a herb that is commonly used in traditional Chinese medicine and Ayurveda to treat a variety of infections, including TB. Andrographis paniculate contains a compound called andrographolide, which has been shown to have anti-tuberculosis activity in laboratory studies and in some clinical trials.[8]

It is important to note that herbal treatments for TB should not be used as a substitute for conventional medical treatment. TB is a serious disease, and it is important to seek medical attention if you have any symptoms of TB, such as a persistent cough, fever, night sweats, or weight loss.

If you are considering using herbal treatments for TB, be sure to talk to your doctor first. Your doctor can help you to weigh the risks and benefits of herbal treatments and can monitor your progress if you decide to use them.[13]

5. Aim & objective

The aim of tuberculosis (TB) control programs is to reduce the incidence and mortality of TB, and to prevent the spread of the disease. The objectives of TB control programs include:

- To diagnose and treat all cases of TB promptly and effectively.
- To prevent the development of drug-resistant TB.
- To reduce the risk of TB transmission.
- To protect vulnerable populations from TB.
- To improve the quality of life for people with TB.
- To achieve these objectives, TB control programs typically focus on the following activities:

Diagnosis of TB

Medical diagnosis (abbreviated Dx,[1] Dx, or Ds) is the process of determining which disease or condition explains a person's symptoms and signs. It is most often referred to as diagnosis with the medical context being implicit. The information required for diagnosis is typically collected from a history and physical examination of the person seeking medical care. Often, one or more diagnostic procedures, such as medical tests, are also done during the process. Sometimes the posthumous diagnosis is considered a kind of medical diagnosis[13]

Radiography is an important tool in diagnosis of certain disorders.

Diagnosis is often challenging because many signs and symptoms are nonspecific. For example, redness of the skin (erythema), by itself, is a sign of many disorders and thus does not tell the healthcare professional what is wrong. Thus, differential diagnosis, in which several possible explanations are compared and contrasted, must be performed. This involves the correlation of various pieces of information followed by the recognition and differentiation of patterns. Occasionally the process is made easy by a sign or symptom (or a group of several) that is pathognomonic.

Diagnosis is a major component of the procedure of a doctor's visit. From the point of view of statistics, the diagnostic procedure involves classification tests.

TB is diagnosed through a combination of tests, including:

Sputum culture: This test involves collecting a sample of sputum (phlegm) and growing it in a laboratory to see if MTB is present.

X-ray: An X-ray of the chest can be used to look for signs of TB, such as lesions or scarring.

Nucleic acid amplification test (NAAT): This test can detect MTB DNA in sputum or other samples.

Treatment of TB

TB is treated with a combination of antibiotics for several months. The length of treatment depends on the type of TB and the patient's response to treatment.[13]

Prevention of TB

The best way to prevent TB is to get vaccinated with the BCG vaccine. The BCG vaccine is not very effective at preventing TB disease in adults, but it can be helpful in preventing severe TB disease in children.

Other ways to prevent TB include:

Avoiding close contact with people who have TB

Getting tested for TB if you are at risk

Completing the full course of TB treatment if you are diagnosed with TB disease

Challenges in TB control

One of the biggest challenges in TB control is the emergence of drug-resistant TB. Drug-resistant TB is TB that is no longer susceptible to one or more of the first-line TB drugs. Drug-resistant TB is more difficult and expensive to treat, and it can be fatal.[9]

Another challenge in TB control is the high burden of TB in low- and middle-income countries. These countries often have limited resources for TB control programs, and many people do not have access to quality healthcare.[9]

Risk factor

Epidemiology, a risk factor or determinant is a variable associated with an increased risk of disease or infection.

Result:-

Tuberculosis (TB) is a disease caused by germs that are spread from person to person through the air. TB usually affects the lungs, but it can also affect other parts of the body, such as the brain, the kidneys, or the spine. A person with TB can die if they do not get treatment.

9. Conclusion

- According to the Survey Carried out, people in those Areas have Very Good knowledge about the disease Tuberculosis. So, the awareness programmers carried out by the Sri Lankan Government & Non-Government organizations Are Very Successful in those areas.
- It is better to use Media like Television, Internet and Radio to strengthen the awareness programmed.
- It's essential to get Support from Society, Sri Lankan Government, Non-Government organizations and All Responsible Parties to Prevent & Eradicate Tuberculosis (TB) from Whole Sri Lanka.
- Though these findings cannot be generalized, it is revealed that despite a good knowledge, positive attitudes and good practice toward TB disease is directly need for the community to clarify the misperception about pulmonary TB that spreading in the community. Health education structurally and sustainable about TB prevention and treatment is need to providing for family and community.
- • Using GIS in performing temporal and spatial analysis of tuberculosis incidence can play a crucial role in recognizing trends and spatial pattern of such a disease.
- This, in turn, may considerably support designing and implementing control programs and guide the resource allocation.
- The application of GIS in performing spatial and temporal analysis of TB requires availability of data on TB cases and incidence rates at different levels

10. Reference:-

1. McKeown T. The Role of Medicine. Princeton: Princeton University Press, 1979.
2. Frieden TR. Tuberculosis control and social change. Am J Public Health1994;84:1721
3. Styblo K, Bumgarner JR. Tuberculosis can be controlled with existing technologies: evidence. Tuberculosis Surveillance Research Unit, Progress Report, 1991, pp. 60–72.
4. Frieden TR, Fujiwara PI, Washko RM, Hamburg MA. Tuberculosis in New York City—turning the tide. New Engl J Med1995;333:229–33.
5. Suarez PG, Watt CJ, Alarcon E et al. The dynamics of tuberculosis in response to 10 years of intensive control effort in Peru. J Infect Dis2001;184:473–78.
6. Marrero A, Caminero JA, Rodriguez R, Billo NE. Towards elimination of tuberculosis in a low-income country: the experience of Cuba, 1962–97. Thorax2000;55:39–45.
7. World Health Organization. Treatment of Tuberculosis, Guidelines for National Programmers. Geneva: World Health Organization, 1997.
8. Hinshaw HC, Feldman WH. Streptomycin in the treatment of clinical tuberculosis: a preliminary report. Proc Staff Meet Mayo Clinic1945; 20:313–18.
9. Crofton J. The contribution of treatment to the prevention of tuberculosis. Bull Int Union Tuberc1962;32:643–53.
10. Styblo K. Epidemiology of Tuberculosis. Vol. 24. The Hague, Royal Netherlands Tuberculosis Association, 1984.
11. Datta M, Radhamani MP, Selvaraj R et al. Critical assessment of smear-positive pulmonary tuberculosis patients after chemotherapy under the district tuberculosis programmer. Tuber c Lung Dis1993;74:180–86.
12. Global Tuberculosis Control: WHO Report 2001. Geneva: World Health Organization, 2001 (WHO/CDS/TB/2001.287).www.tbcindia.org/method.asp
13. Dye C, Fengzeng Z, Scheele S, Williams BG. Evaluating the impact of tuberculosis control: number of deaths prevented by short-course chemotherapy in China. Int J Epidemiol2000;29:558–64.
14. Tuberculosis Research Centre, Chennai. Trends in the prevalence and incidence of tuberculosis in South India. Int J Tuber c Lung Dis2001; 5:142–57.
15. Khatri GR, Frieden TR. The status and prospects of tuberculosis control in India. Int J Tuber c Lung Dis2000;4:193–200.
16. Styblo K, Dankova D, Drapela J et al. Epidemiological and clinical study of tuberculosis in the district of Kolín, Czechoslovakia. Bull World Health Org1967;37:819–74.
17. Frieden TR, Sterling T, Pablos-Mendez A, Kilburn JO, Cairthen GM, Dooley SW. The emergence of drug resistant tuberculosis in New York City. N Engl J Med1993;328:521–26.
18. Fujiwara PI, Cook SV, Rutherford CM et al. A continuing survey of drug-resistant tuberculosis, New York City, April 1994. Arch Int Med1997;157:531–36.
19. Zhang LX, Tu DH, Enarson DA. The impact of directly-observed treatment on the epidemiology of tuberculosis in Beijing. Int J Tuber c Lung Dis2000;4:904–10.

20. Frimodt-Moller J. A community wide tuberculosis study in a south Indian rural population, 1950–55, Bull World Health Organ1960;22: 61–170.
21. Frost WH. How much control of tuberculosis? Am J Public Health1937;27:759–66.
22. Styblo K. Overview and epidemiologic assessment of the current global tuberculosis situation with an emphasis on control in developing countries. Rev Infect Dis1989;11:S339–46.
23. Styblo K. Epidemiology of Tuberculosis. Vol. 24. The Hague, Royal Netherlands Tuberculosis Association, 1984, p. 97.
24. Kaplan GJ, Fraser RI, Comstock GW. Tuberculosis in Alaska, 1970. The continued decline of the tuberculosis epidemic. Am Rev Respir Dis1972;105:920–26.
25. World Health Organization, International Union Against Tuberculosis and Lung Disease, Royal Netherlands Tuberculosis Association. Revised international definitions in tuberculosis control. Int J Tuber c Lung Dis2001;5:213–15.
26. Neuenschwander BE, Zwahlen M, Kim SJ, Engel RR, Rieder HL. Trends in the prevalence of infection with Mycobacterium tuberculosis in Korea from 1965 to 1995: an analysis of seven surveys by mixture models. Int J Tuber c Lung Dis2000;4:719–29.