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STUDY ON THE CURRENT SITUATION AND CHALLENGES OF TUBERCULOSIS

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ABSTRACT

Tuberculosis (TB) is one of the most ancient illnesses of humans, with molecular evidence stretching back to nearly 17,000 years. In spite of modern methods for detection and treatment of TB, regrettably, people are still suffering, and globally it is among the top 10 fatal infectious illnesses, second only to HIV. According to World Health Organization (WHO), TB is a global epidemic. It is a primary cause of mortality among HIV-infected patients. In India, historically speaking, fight against TB can be broadly classified into three periods: early period, before the discoveries of x-ray and chemotherapy; post-independence period, during which nationwide TB control programmes were initiated and implemented; and the current period, during which the ongoing WHO-assisted TB control programme is in place. Today, India's DOTS (directly observed therapy-short course) programme is the fastest-expanding and the biggest programme in the world in terms of patients begun on treatment; and the second largest, in terms of population coverage. Major challenges to control TB in India include poor primary health-care infrastructure in rural areas of many states; unregulated private health care leading to widespread irrational use of first-line and second-line anti-TB drugs; spreading HIV infection; lack of political will; and, above all, corrupt administration. Multidrug-resistant TB (MDR-TB) is another increasing challenge to TB eradication and is a consequence of weak or worsening TB control programme. The study is descriptive in nature and the major objective of the study is to figure it out the challenges and multi-drug resistant tuberculosis.

Keywords: *Bovine TB, DOTS (directly observed treatment-short course), HIV/TB, Multidrug-resistant TB*

1. INTRODUCTION

Tuberculosis (TB) is one of the oldest illnesses known to humanity, having co-evolved with humans for many thousands of years, and perhaps for several million years. It is one of the most contagious diseases in

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the world, affecting around one in every 100 people. It was discovered in a fossilised buffalo (Pleistocene bison), which had been radiocarbon dated at 17,870 230 years, and in 9000-year-old human bones that were discovered in a neolithic town in the Eastern Mediterranean that the earliest known molecular evidence of tuberculosis (TB). Despite the fact that Dr. Richard Morton discovered in 1689 that the pulmonary form of tuberculosis was associated with "tubercles," it was not until the 1820s that tuberculosis was recognised as a single disease, and it was only in 1839 that J. L. Schönlein coined the term "tuberculosis" to describe the disease's variety of symptoms. Mr. Koch identified the bacillus that causes TB in 1882, and he was given the Nobel Prize in physiology or medicine in 1905 for his work on this finding. Tuberculosis is caused by a collection of closely related bacterial species known as the Mycobacterium tuberculosis complex, which is responsible for the disease. In the modern era, Mycobacterium tuberculosis is the most common cause of TB in humans. M. bovis, M. microti, and M. africanum are all members of the Mycobacterium TB complex that are capable of causing tuberculosis. M. microti is not known to cause tuberculosis in people, and infection with M. africanum is very uncommon. M. bovis, on the other hand, has a broader host range and is the primary cause of tuberculosis in other animal species, including humans. Humans get infected with M. bovis by the consumption of contaminated milk, milk products, or meat from infected animals. It is believed that M. bovis was responsible for around 6% of all TB fatalities in humans prior to the discovery of antibiotics in the 1950s.

The fact is that, despite the availability of more advanced diagnostic and treatment options for tuberculosis, millions of people continue to suffer and die as a result of this illness. TB is one of the top three infectious killer illnesses in the world, after HIV/AIDS, which kills 3 million people each year, TB, which kills 2 million, and malaria, which kills 1 million people each year. Despite the fact that tubercle bacilli were first discovered about 130 years ago, a precise knowledge of the aetiology of this illness remains elusive to date. Even while it may afflict anyone of any age, persons with compromised immune systems, such as those suffering from HIV infection, are at greater risk. Because the immune system of healthy individuals effectively blocks the spread of the pathogenic germs, tuberculosis infection in healthy persons is often asymptomatic. This bacteria survives and grows in macrophages, where it is protected from the body's natural defence mechanism, which is present in the patient's serum. There are two phases of TB infection: asymptomatic latent tuberculosis infection (LTBI) and active tuberculosis illness. Without treatment, the death rate for this condition exceeds 50% if it is left untreated.

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2. INDIAN SCENERAIO

In India, tuberculosis (TB) has been described in the Vedas and in ancient Ayurvedic texts. When it comes to fighting tuberculosis in India, it can be divided into three periods: the pre-discovery period, which includes the discovery of x-rays and chemotherapy; the post-independence period, which includes the implementation of nationwide TB control programmes; and the current period, which includes the ongoing WHO-assisted TB control programme currently in place.

2.1 Early stages of tuberculosis control

Lack of availability of any chemotherapeutic medicines, lack of diagnostic x-ray facilities, and absence of any kind of tuberculosis control programme were among the characteristics of the situation. This era lasted roughly from the middle of the twentieth century until the present. Given the fact that there were no effective anti-TB therapies or combinations of pharmaceuticals available during this time period, a sanatorium movement began in Europe and soon expanded around the globe during this time period. Popular justification for sanatoria was that an intensive regimen of rest, proper nourishment, open fresh air, and high altitude provided the greatest opportunity for a patient's immune system to "wall off" pockets of pulmonary tuberculosis (TB) infection and prevent the disease from spreading. Hermann Brehmer founded the world's first sanatorium, the Brehmerschen Heilanstalt für Lungenkranke, in the city of Görbersdorf (Sokoowsko), Silesia, in 1863 to cure TB patients. The sanatorium was the first of its kind in the world (now Poland).

It was in 1906 at Tiluania, near Ajmer, Rajasthan, that the first open-air sanatorium for TB treatment and isolation patients was established, followed by the establishment of the first TB facility in Bombay, Maharashtra, the following year. It wasn't until 1925 that chest radiography began playing a diagnostic role in the detection of deep-seated regions of tuberculosis consolidation. Within a year of World War II, the capabilities of this device had been improved to include the MMR (mass miniature radiography) version. The first true victory in the fight against tuberculosis came with the development of tuberculosis vaccine. When Albert Calmette and Camille Guerin created the BCG (bacillus of Calmette and Guerin) in 1906, they were working with an attenuated bovine TB strain. The BCG vaccine was first administered on humans, on July 18, 1921, in France. In 1948, with the assistance of the World Health Organization and the United Nations Children's Fund, a BCG vaccine manufacturing facility in Guindy, Madras (now Chennai) was established. In 1951, India launched a nationwide BCG programme to combat tuberculosis. As part of the

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first countrywide campaign against tuberculosis, the message of health and disease prevention was carried to the most distant corners of the country for the first time in the country's history, a first in the world.

2.2 Initial countrywide tuberculosis control initiatives after independence

This era may be neatly split into two parts, which are as follows:

2.2.1 District tuberculosis control programme

The Indian government developed the District Tuberculosis Program in 1961, and Anantapur district in the state of Andhra Pradesh served as the country's first model district tuberculosis centre (DTC). To minimise the TB issue in the community as cost effectively as feasible, this initiative sought to integrate tuberculosis control methods with current government health services. Almost immediately after the establishment of the Anantapur DTC, it became clear that, although case-finding could be accomplished at any location without trouble, the most challenging aspect of the TB war was maintaining patients on continuous treatment until cure was achieved. In 1962, the Indian government started the National TB Control Program, which was based on the paradigm of district TB centres (NTCP).

2.2.2 The age of short-course chemotherapy has arrived.

Effective medications against tuberculosis (TB) began to become accessible in the middle of the twentieth century, around the time of India's independence from Britain in 1947. (Streptomycin: 1944, PAS: 1946, Thiacetazone: 1950, Isoniazid: 1952 and Rifampicin: 1966). The Tuberculosis Research Center (TRC) was established in Chennai in 1956 under the auspices of the Indian Council of Medical Research (ICMR), the government of the state of Chennai, the World Health Organization (WHO), and the British Medical Research Council (BMRC). The TRC was funded by the Indian government and the British Medical Research Council (BMRC). This centre offered information on the widespread use of chemotherapy in the home setting for the treatment of pulmonary tuberculosis (TB). Founded in 1959 in Bangalore, the National Tuberculosis Institute (NTI) was tasked with developing a workable tuberculosis programme that could be implemented in all regions of the nation by educating medical and paramedical professionals to effectively use proven methodologies in both rural and urban areas.

The emergence of two well-tolerated and very successful medications, Rifampicin and Pyrazinamide, resulted in dramatic advances in the treatment of tuberculosis in the 1970s. These medications made it feasible to use short-course chemotherapy (SCC), which simplified treatment and reduced its length. The

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discovery of Rifampicin in 1967 is widely regarded as one of the most significant breakthroughs in the history of anti-tuberculosis medication research. Since its discovery, no new medicine has been developed that is as effective as Rifampicin in the treatment of tuberculosis.

3. HIV AND TB

HIV-positive patients with TB are 20-40 times more likely to acquire active TB than HIV-negative people living in the same country. TB is the most frequent HIV-associated opportunistic illness in the world; it accelerates HIV disease progression, increases infectivity, and reduces HIV treatment effectiveness.

At the end of 2007, there were 2.5 million PLHIV in India, and 1.8 million TB cases every year. HIV-TB interaction is bidirectional and synergistic in HIV-TB co-infected people. The amount of immunosuppression dictates the disease's clinical appearance. Approximately 75% of HIV/TB patients have pulmonary involvement. The most prevalent extrapulmonary type of TB in HIV-positive patients involves lymph nodes, with the cervical area being the most common. Co-infection with HIV and TB accelerates MDR-TB development.

The Nationwide AIDS Control Organization and the Central TB Division have created a national strategy to coordinate HIV/AIDS and TB actions. Both programmes' national strategies include TB and TB/HIV interventions. In 2008, the national programme reported 1.5 million TB patients, 73,720 of which were HIV positive. The redesigned “national framework of combined TB/HIV collaborative activities” went into effect in early 2008, including the whole country. A 2008 “intensified TB/HIV package” is currently being implemented in 11 states and districts with high HIV prevalence, encompassing approximately 400 million people. The Indian government wants to extend the enhanced package nationwide by 2012.

According to current recommendations (National AIDS Control Organization, 2007), TB needs 6 months of therapy, with 4 medications (including Rifampin) in the intensive phase and 2 in the maintenance phase.

It is treated with INH, RIF, EMB, and PYZ for 2 months, then INH and RIF for 4 months, either daily or sporadically. It further categorises antiretroviral (ART) drugs as follows: NRTIs, NNRTIs, protease inhibitors, integrase inhibitors, chemokine receptor antagonists, and entry (fusion) inhibitors. In Brazil, patients on HAART (highly active antiretroviral treatment) (a combination of at least 3 ART medications) had an 80% lower incidence of TB than those on ART-naive. [38] In India, individuals with HIV/TB should take two NRTIs plus Efavirenz or, less usually, Nevirapine. The most common NRTI combinations are Zidovudine with Lamivudine, Stavudine with Lamivudine, Tenofovir with Lamivudine, and Abacavir with

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Lamivudine or Didanosine with Lamivudine. The most prevalent infection linked with IRIS is tuberculosis, which causes lymph node enlargement. In one research, IRIS was seen in 2% of TB patients, 7% of those with HIV, and 36% of those on HAART.

Previously, HIV surveillance among TB patients was done via specific questionnaires, but today it is done routinely. The inclusion of decentralised administration of co-trimoxazole preventive treatment (CPT) for HIV-infected TB patients in national policy stems from pilot testing in three high-HIV prevalence areas of Andhra Pradesh. PLHIV are eligible for free HIV care at a network of ART clinics. Some are placed in private or NGO facilities, while others are located at medical institutions. In September 2009, the nation has 217 ART clinics and eleven Regional Centers of Excellence for PLHIV.

4. CURRENT CHALLENGES

TB still kills two Indians every three minutes. Unregulated private health care leads to widespread illogical use of first-line and second-line anti-TB medications; growing HIV infection; poverty; lack of political will; and, most all, corrupt management. NTCP is working with the National Rural Health Mission (NRHM), a reform project aimed at improving primary health care in rural regions. NTCP has also launched numerous programmes to enhance TB care in collaboration with the commercial sector and the IMA.

Surprisingly, in India, most still believe TB is a disease of the poor, especially slum dwellers. The wealthy should be aware that their chefs, maids, and chauffeurs may be asymptomatic carriers of this terrible illness, and that they may get TB even without entering the slums. Human TB (Mycobacterium bovis) has been shown to be transmitted by unpasteurized milk and raw milk products.

5. MULTIDRUG-RESISTANT TUBERCULOSIS

Multidrug-resistant TB (MDR-TB) strains are M. tuberculosis bacteria that are resistant to both isoniazid and rifampicin. XDR-TB is a type of TB caused by bacteria resistant to Isoniazid, Rifampicin, any fluoroquinolone, and any of the second-line anti-TB injectable medicines (amikacin, kanamycin or capreomycin). These TB strains do not respond to the conventional six-month first-line anti-TB medication therapy and may take two years or more to cure with less effective, more toxic, and more costly treatments. MDR-TB and XDR-TB are increasing concerns to TB programmes.

“The biggest calamity that can happen to a patient with TB is that his germs grow resistant to two or more of the usual drugs,” said Sir John Crofton, whose pioneering work in using combination medication therapy for

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tuberculosis saved many lives. Drug resistance may be a tragedy for both the patient and others since the sick can infect others with his drug-resistant organisms."

Primary and acquired drug resistance exist. Primary resistance occurs in patients who have never had anti-TB medication. Acquired resistance arises as a consequence of prior therapy. WHO and IUATLD now refer to medication resistance as primary in new instances and acquired in previously treated patients. Drug resistance in TB patients is primarily due to inadequate or failing TB control strategies. A lack of knowledge by health care workers about TB treatment and control, interruption of chemotherapy due to side effects, non-adherence of patients to prescribed regimens, availability of anti-TB drugs without prescription, illiteracy, and low socioeconomic status all contribute to drug resistance. The current policy for treating MDR-TB suggests a consistent treatment regimen for patients who have previously only received first-line TB medicines. Streptomycin, Pyrazinamide, Ethambutol, and Thioacetazone are essential medications, whereas Aminoglycosides (Kanamycine, Amikacin, capreomycine) and Thioamides (Ethionamide, Prothionamide) are second-line treatments. A patient with bacilli resistant to all but two or three very mild medications should consider surgery. Sadly, many of these patients will have too much illness or too little lung function for surgery. Surgery should be considered if the patient has a big localised cavity, good lung function, and only two or three (poor) medications available. Since current medication resistance statistics influence treatment regimens and policy, trustworthy data at the national level is critically required. In 2005, 0.04 percent of TB cases in India were MDR-TB, which increased to 0.15 percent (four times) in 2007. MDR-TB services are currently accessible in six states, including culture and DST capabilities in five state labs. Insufficient laboratory capacity limits MDR-TB service expansion.

6. CONCLUSION

According to the preceding debate, we have gone far in our struggle against TB, but as the renowned English poet Robert Frost remarked, "... miles to go before I sleep", we still have much to go. WHO's "STOP TB" policy aims to eradicate TB as a public health issue by 2050. We need to improve our surveillance efforts to appropriately assess the burden of all TB (childhood, HIV/TB, MDR-TB). The reasonable use of first- and second-line anti-TB medications must be regulated. They should never be marketed as OTC medications. Local governments in India and other developing nations should actively promote local manufacture of anti-TB medications, allowing for better monitoring of manufacturing and quality control standards. Monitoring product quality should include detecting faulty items due to poor

manufacturing processes, degraded products due to poor distribution and storage, and adulterated, manipulated, or counterfeit products due to vested interests. Contraband and substandard drugs, notably antimalarials, are widely circulated in underdeveloped nations. If counterfeit pharmaceuticals of this kind are accessible in the market, it is reasonable to suppose that counterfeit anti-TB drugs exist as well.

This illness should be better understood and controlled by working together with doctors, business sector, religious groups and other local non-profit organisations like Lions Club and Rotary International. Existing diagnostic labs require regular training/refresher courses for staff to best use finite resources. Better field diagnostic assays for this illness should be developed and made accessible to farmers. Using human resources from related public health programmes, e.g., HIV/malaria programmes, promoting development of new drugs and vaccines against TB, and discouraging the use of homoeopathy medicines for treating TB and HIV should be prioritised.

To remove possible zoonotic sources of TB, organised goat/sheep abattoirs should be required by legislation, where milk samples and corpses may be consistently tested/examined for TB. TB vaccination and regular screening of animals (e.g., annually at farms and at animal fairs) should be made obligatory. We cannot tackle TB without recognising the zoonotic nature of the illness.

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