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Tuberculosis: Current situation, Challenges and Overview of its control programme in India.

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Abstract : Tuberculosis (TB) is one of humanities oldest disease, with molecular evidence dating back to more than 17,000 years. Tuberculosis (TB) remains one of the deadliest infectious diseases, causing millions of deaths worldwide each year. In this article, we provide an overview of tuberculosis, including pathogenesis, diagnosis, and treatment guidelines. Tuberculosis (TB) remains one of the deadliest infectious diseases, causing millions of deaths worldwide each year. In this article, we provide an overview of tuberculosis, including pathogenesis, diagnosis, and treatment guidelines. Despite newer methods to diagnose and treat tuberculosis, unfortunately people still suffer and it is among the 10 deadliest infectious diseases in the world, second only to HIV. According to the World Health Organization (WHO), tuberculosis is a global pandemic. It is the leading cause of death in people infected with HIV. Historically, India's fight against tuberculosis can be classified in three periods: the initial phase, before the discoveries of X-ray and chemotherapy; the post-independence period when national tuberculosis control programs were initiated and implemented; and the current period during which the ongoing TB control program continues. Today, India's DOTS (Directly Observed Short Course of Treatment) program is the fastest growing and largest program in the world in terms of the number of patients initiated. And the second largest population coverage. Major challenges to TB control in India include poor primary health care infrastructure in rural areas of many states; unregulated private healthcare leading to widespread irrational use of first- and second-line TB drugs; spread of HIV infection; lack of political will; and above all corrupt administration. Multidrug-resistant tuberculosis (MDR-TB) is another emerging threat to TB eradication and is caused by inadequate or deteriorating TB control programs. Through its "STOP TB" strategy, WHO has set avision to eliminate tuberculosis as a public health problem from this earth by 2050. The information in this review article is available on the official WHO website; Ministry of Health and Government of India were consulted and PubMed® Google Scholar® search engines were used.

Keywords : DOTS, MDR-TB(Multidrug-Resistant Tuberculosis), RNTCP (Revised national TB control programe), STOP TB strategy, WHO (world health organization), HIV.

1.1INTRODUCTION

Tuberculosis (TB) remains a formidable global health problem and India bears a significant burden of the disease. As one of the countries most affected by tuberculosis in the world, India faces unique challenges in managing and controlling this infectious disease. The introduction provides an overview of the current TB situation in India and highlights key statistics, trends and factors contributing to the prevalence of the disease. Begin by presenting TB as a global health problem and highlight its impact on morbidity, mortality and health systems worldwide. Discuss the historical context of tuberculosis, its resurgence in recent decades, and the emergence of drug-resistant strains, including multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). Emphasize the importance of TB control in India, considering its socio-economic impact, public health impact and challenges posed by population factors, health infrastructure and access to medical care. Specify the objectives of the review article, which may include, to conduct a comprehensive analysis of the current epidemiological situation of TB in India, to identify and discuss challenges and barriers to the effectiveness of TB control. Review of current TB control programs in India, practices and interventions. Assess the impact of these programs, identify gaps and make recommendations for improvement. Discuss the role of research, innovation and international cooperation in advancing TB control efforts in India. Highlighting these key elements in the introduction, the review paper lays the foundation for a comprehensive management analysis of TB in India and emphasizes the importance of understanding

the current situation. challenges and opportunities to improve TB prevention, diagnosis, treatment and care. You can certainly structure a section on the epidemiology of TB in India as follows:

1.2Epidemiology of Tuberculosis in India:

Present current statistics on TB prevalence and incidence in India. Highlight trends over time, including changes in prevalence rates and reporting of new cases. Discuss geographic variation in TB. Prevalence in India considering rural-urban differences and regional differences. Analyze demographic factors that influence TB burden, such as age, sex, socioeconomic status, and occupation. Discuss the effects of population density, migration, and living conditions on TB transmission and disease. Identify vulnerable populations at increased risk of TB, including marginalized communities, migrants and health workers.

Estimate the prevalence of drug-resistant TB strains, including multidrug-resistant TB (MDR-TB) and extensively drugresistant TB (XDR-TB). Discuss the problems driven by drug resistance in TB treatment, diagnosis and treatment. Emphasize efforts to monitor drug resistance trends, surveillance systems and strategies to combat drug-resistant TB in India. Explore the intersection of tuberculosis and other health conditions such as HIV/AIDS, diabetes, malnutrition and chronic respiratory diseases. Discuss the impact of co-morbidities on outcomes. And treatment responses in tuberculosis and health care management. Address the challenges of managing TB-HIV co-infection and integrated care and treatment strategies.

Review national and state level TB control programs and policies in India. Evaluate the effectiveness of interventions such as case detection, treatment, contact tracing and infection control measures. Discuss the progress, achievements, challenges and areas for improvement in TB control. Discussion of these aspects in the epidemiology section provides a comprehensive overview of the TB situation in India, including prevalence rates and demographics. Patterns, trends in drug resistance, comorbidities and the public health response to TB control

1.3Current situation:

The WHO released the Global TB Report 2022 on 27 October 2022. The report notes the impact of the COVID-19 pandemic on the diagnosis, treatment and burden of TB worldwide in October 2022 and which explains that India actually fared significantly better well over time. Compared to other countries. The incidence of tuberculosis in India in 2021 is 210 cases per 100,000 population – compared to the base year of 2015 (India had an incidence of 256 cases per 100,000 population); the decline was 18 percent, which is 7 percentage points better than the world average of 11 percent. These figures also place India 36th in terms of incidence (from highest to lowest). While the COVID-19 pandemic affected TB programs worldwide, India was able to successfully offset the disruption by implementing critical interventions in 2020 and 2021. – resulting in more than 21.4,000 TB cases reported to the National TB Elimination Program – an 18% increase over 2020. This success is due to several forward-looking measures that the program has implemented over the years, such as a mandatory reporting policy that ensures that all incidents are reported to the government.

In addition, enhanced door-to-door active case-finding has been a pillar of the program to screen patients and ensure households are not missed. In 2021, more than 22 million people have been tested for tuberculosis. The goal was to find and detect more cases to stop the spread of the disease in the community, which contributed to a reduction in morbidity. To this end, India has also increased its diagnostic capacity to strengthen detection efforts. Molecular diagnostics developed by indigenous peoples helped to expand the reach of diagnosis to all regions of the country. India has more than 4,760 molecular diagnostic devices across the country, reaching every district. In this background and before the global report was released, the Ministry of Health and Family Welfare informed WHO that the Ministry had already started domestic investigations. Systematically to get a more accurate estimate. Incidence and mortality and data for India will be provided after the studies are completed in early 2023.

The WHO also acknowledged the position of the Ministry of Health on the issue and stated in the report that "The estimates of TB incidence and mortality in India for the period 2000-2021 are preliminary and prepared in consultation with the Ministry of Health and Family Welfare, India. ."Results of a Ministry of Health survey initiated by the TB Department. CTD), will be available in about six months and will continue to be shared with WHO. The moves coincide with India conducting its own national prevalence survey to assess the true burden of TB in the country – the largest ever in the world. The WHO report said that India was the only country to conduct such a survey in 2021, when "India made a significant recovery". The WHO report also emphasized the crucial role of nutrition and malnutrition. Which affect the development of active tuberculosis. In this regard, the Nutrition Support Scheme of the Tuberculosis Program – Ni-kshay Poshan Yojana – has proved critical for the vulnerable. In 2020 and 2021,
India provided cash transfers worth USD 89 million (INR 670) to TB patients through the Direct Grant Transfer Program. In
September 2022, the Honorable President of India also launched a first-of-its-kind initiative, Pradhan Mantri TB Mukt Bharat Abhiyan, which provides additional nutritional support to people undergoing TB treatment through donations from the community, including individuals and organizations. So far, 40,492 donors have registered to support more than 10,45,269 patients across the country.

1.4Government programmes for TB control in India:

1.4.1**National Tuberculosis Elimination Programme (NTCP) :**

As per (NTCP) National Tuberculosis Elimination Programme , including its objectives, scope and implementation strategies. Discuss the main components of the TCP such as case detection, treatment, follow up support and infection control measures.

Assess the effectiveness of NTCP interventions in improving TB outcomes, reducing transmission and improving health care for TB patients. Explain the DOTS strategy as a cornerstone of TB treatment based on the NTCP. Discuss the principles of DOTS, including supervised treatment, standard drug regimens , patient education, and treatment monitoring. Assess the impact of DOTS on treatment success, compliance and prevention of drug resistance.

1.4.2Revised National Tuberculosis Control Programme (RNTCP) :

As per (RNTCP) Revised National Tuberculosis Control Programme , including revisions, additions and program changes. Discussing innovations and best practices added to the RNTCP to address emerging problems like drugs. – resistant TB. And other diseases. Analyze RNTCP results and achievements in improving TB control and patient outcomes.

In India, a significant proportion of people with symptoms suggestive of pulmonary tuberculosis turn to the private sector for immediate health care needs. However, the private sector is overburdened and lacks the capacity to treat such a large number of patients. Private provider interface agencies (PPIAs), recommended by the RNTCP, help treat and monitor large numbers of patients by providing care vouchers, electronic case reports and information systems for patient tracking. The lack of training and coordination in the private sector is worry suppliers , compliance with the RNTCP protocol among private providers is quite variable, with less than 1% of private providers complying with all RNTCP recommendations. The various anti-tuberculosis treatment programs used by family doctors and other private sector operators must be legalized. Treatment by private doctors is different from RNTCP treatment. If treatment is started in the conventional private sector, it is difficult for the patient to switch to the RNTCP panel. Studies have shown that rates of defective anti-TB prescriptions in India's private sector range from 50% to 100%, and this is a concern for TB treatment, which is currently provided by India's largely unregulated private sector.

1.4.3National Tuberculosis Control Programme (NTP) :

Underline public awareness campaigns and initiatives aimed at increasing TB awareness, reducing stigma and promoting early diagnosis and treatment. Discuss partnerships with CSOs, NGOs and media . and community leaders in TB advocacy. Assess the impact of public information campaigns on health care seeking, adherence and community participation in TB control. The National Tuberculosis Control Program (NTP) of India has used effective outpatient treatment since 1962 as a multidrug regimen consisting of isoniazid, rifampicin, pyrazinamide, and ethambutol. The NTP organization consists of 390 district TB centers responsible for case detection through clinical examination, sputum and X-ray examinations, case management and surveillance, reporting and surveillance.

NTP also has 330 clinics in urban areas providing 47,300 beds for serious TB cases. The number of new tuberculosis cases increased from 1.13/1000 population in 1981 to 1.80/1000 population in 1991. Therefore, the NTP strategy was revised to achieve a high cure rate (85%) and treat at least 100 sputum-positive patients. 100,000 population, which reduces morbidity and mortality. The estimated annual risk of infection ranges from 0.6% to 2.3%, while in rural South India the risk of infection decreased from 1% in 1961 to 0.61% in 1985. A poorly functioning surveillance program resulted in high numbers of chronic diseases and drug addiction. Resistance to both rifampicin and isoniazid, which can lead to the development of an incurable form of tuberculosis. At least 50% of the population over the age of 20 is infected and India's current risk of infection is 1.7-2%. The proportion of smearpositive cases decreased from 25% in 1980 to around 20% in the late 1980s; however, failures and partially treated patients are included in these reported numbers. At the current average annual risk of infection of 1.7 percent, 1.6 million new cases of TB occur each year, of which 710,000 are smear-positive.

About 75% of diagnosed cases occur in people between 15 and 44 years of age, and two-thirds of cases occur in men; however, in women, 50% of cases occur before the age of 34. The mortality rate of tuberculosis is estimated at 420,000 deaths per year (i.e. 50/100,000 population). HIV seropositivity is high among tuberculosis patients: at the end of 1993, 331 (60%) of 559 AIDS patients had active tuberculosis. NTP operational studies are underway to improve efficiency.

1.4.4Tuberculosis Mukt Bharat Abhiyan:

The MoHFW along with various development partners of the Ministry of Health launched the Tuberculosis (TB) Mukt Bharat Abhiyan in 2021 under the NSP India 2020-25 program for TB Elimination, a major task to end the TB epidemic by 2025. dimensional approach that aims to identify all TB patients and aims to reach patients seeking TB care from private practitioners and among populations at high risk of undiagnosed TB. To achieve the ultimate goal of TB Mukt Bharat (TB-free India), WHO-India is also preparing to implement the GATIMAN project to improve technical assistance in the areas of public-private partnership, TB control, data management, applied research and . medicines drug-resistant tuberculosis, laboratories, tuberculosis infection control, and advocacy and communication between states and universities. Apart from all these issues, WHO India has also identified and validated 100 hard to reach and neglected areas to end TB in India.

Before the start of the coronavirus pandemic (COVID-19), tuberculosis was the leading cause of death from an infectious disease, far surpassing HIV/AIDS. Almost a quarter of the world's population is infected by M. tuberculosis. Tuberculosis is treatable and preventable. About 85% of people who develop tuberculosis can be successfully treated with six months of drug therapy. Universal health coverage (UHC) is necessary to ensure that all sufferers of diseases or infections have access to these treatments. The number of people who become infected and then become ill (and thus the number of deaths from TB) can also be reduced by multi-sectoral efforts to address the factors that contribute to TB, such as poverty, under nutrition and malnutrition, HIV infection and smoking. . Some countries have already reduced the incidence of TB to less than ten and less than one death per

100,000 inhabitants per year . India's rate is 193 per 100,000 population per year . Research breakthroughs (eg, a newer vaccine) are needed to quickly reduce the number of new cases (incidence of TB) worldwide to levels already reached in these low-income countries.

Globally, tuberculosis is the leading cause of death from infectious diseases in adults and has been considered a global public health emergency for the past 25 years.

Research and Innovation:

Research priorities, funding mechanisms and collaboration between academic institutions, research centers and industry partners. Emphasize TB diagnosis, drug development innovations, vaccines and digital health technologies to advance TB control in India.

Monitoring and Evaluation:

Including monitoring systems, data collection and performance indicators. Assess strengths and weaknesses of monitoring and evaluation frameworks for assessing program effectiveness, identify gaps, and make policy decisions. Emphasize recommendations to improve monitoring and evaluation processes to improve TB control outcomes and program accountability.
This is a comprehensive review of government policies and programs provides a detailed overview of initiatives and interventions

1.5Challenges of TB control in India:

Discuss the emergence and spread of drug-resistant strains of TB, including multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB). Analyze the challenges of diagnosis. And diagnosis. Treatment of drug-resistant tuberculosis, such as limited access to second-line drugs, diagnostic tools and specialized health services. Consider the impact of drug resistance on treatment outcomes, patient care and health costs.

Identify factors that contribute to delay in TB diagnosis, including limited access to quality diagnostic tests, Discuss the impact of delay. Diagnosis of disease. Progression, prevalence and impact on public health. Emphasize efforts to improve early detection of cases, including rapid diagnostic tests, treatments and community-based screening programs.
Explore adherence issues in TB patients, including lengthy treatment, complex regimens, side effects, and socioeconomic factors. Discuss strategies to improve adherence, such as patient education, counselling, psychosocial support and innovative surveillance techniques. Consider the impact of non-adherence on treatment outcomes, drug resistance and effectiveness of TB control programmes. Explore the stigma associated with TB in India, which leads to delayed diagnosis, avoidance of treatment, social isolation and discrimination against those affected.- Discuss the impact of stigma on health seeking. , patient-provider communication and community understanding of TB .- Emphasize anti-stigma initiatives, awareness campaigns and advocacy efforts to eliminate stigma, promote empathy and support patients with TB.

Assess health infrastructure challenges in controlling TB in India, including limited resources, inadequate staffing, overcrowded facilities and disparities in access to treatment, Discuss the need to strengthen health infrastructure, expand. Diagnostic and treatment facilities, improve laboratory capacity and train health workers. Address the role of telemedicine, digital health technologies and innovative health care models to overcome infrastructure challenges and improve access to TB care. In exploring these challenges. Provides a comprehensive, nuanced understanding of the barriers to TB control in India and identifies options for intervention, policy reforms, and resource allocation to strengthen TB control programs.

1.6Conclusion:

As the above discussion shows, we have come far in our fight against this deadly disease, but as the famous English poet Robert Frost said, "…miles to go before I sleep," we still have miles to go. . go before we liberate this planet TB. With its "STOP TB" strategy, the WHO set a vision to eliminate tuberculosis as a public health problem on earth by 2050.[46]To strengthen the fight against this deadly disease, we must strengthen our surveillance programs to accurately estimate the burden of all forms of TB (childhood, HIV/TB, MDR-TB). There is an urgent need to regulate the rational use of first- and second-line tuberculosis drugs. Under no circumstances should they be sold as an over-the-counter drug. In India and other developing countries, local governments should invest and encourage efforts in the local production of TB drugs, leading to effective monitoring of their production and quality control standards. Monitoring the quality of products available on the market should include the identification of products that are damaged in manufacturing practices; damaged due to inadequate distribution and storage; and forged, forged, or forged for the benefit ofomes. Many studies have documented the spread of counterfeit and low-quality drugs, especially antimalarial drugs, in developing countries.[47-49] If counterfeit drugs in this category are not the market, it is reasonable to assume that counterfeit drugs TB drugs also are available on this market.

Despite efforts to end tuberculosis, morbidity and mortality are declining rather slowly, making tuberculosis a major global health threat. This situation has been further affected by COVID-19 and other conflicts, including the war in Ukraine, which has created a confusing scenario for TB worldwide. We reiterate that "war is the enemy of health" [18], that TB is closely linked to social factors and poverty, and that strong and credible multi-sectoral efforts are urgently needed to address it. In addition to good health practices and good outcomes of TB services, the fight against TB must focus on bold policies. Without adequate nutrition, universal health care and social security, we cannot improve TB outcomes. Without a global approach to health that includes areas that focus on poverty alleviation, social protection, nutrition, clean energy, sustainable cities, gender equality, equality of societies, etc., we will not reach any goal. While much of the success of TB elimination depends on prompt action by countries in Southeast

Asia and Africa, global action is needed because TB knows no borders: “TB anywhere is TB everywhere,” as the old saying goes. Cried an exclamation. In order to achieve and finish the set goals, TB is crucial through coherent, well-structured, credible, responsible and effective multidisciplinary actions.In addition to TB programs and the health sector, it is necessary to address and mitigate social protection. Is also a key factor in ending TB.

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