

Pulmonary Tuberculosis: A Persistent Threat in the Modern Era of Medicine

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Opinion Article

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ABOUT THE STUDY

Pulmonary Tuberculosis (TB) remains a significant global health challenge, despite decades of concerted efforts to control and eliminate the disease. As one of the oldest known infectious diseases, TB continues to exact a heavy toll on individuals, communities, and healthcare systems worldwide. Understanding the multifaceted nature of pulmonary TB, from its epidemiology and clinical manifestations to diagnosis, treatment, and prevention, is essential in addressing this persistent threat in the modern era of medicine.

TB is caused by the bacterium *Mycobacterium tuberculosis* and primarily affects the lungs, although it can also involve other organs and systems. According to the World Health Organization (WHO), TB remains one of the top 10 causes of death worldwide, with an estimated 10 million new cases and 1.5 million deaths annually. While TB incidence has been declining slowly in recent years, progress has been uneven, with high burden countries in sub-Saharan Africa, Southeast Asia, and the Western Pacific region accounting for the majority of cases. Factors such as poverty, overcrowding, HIV/AIDS, Multidrug-Resistant TB (MDR-TB), and inadequate healthcare infrastructure contribute to the persistence of TB as a global health crisis.

Pulmonary TB can present with a wide spectrum of clinical manifestations, ranging from asymptomatic infection to severe disease.

Common symptoms include persistent cough, hemoptysis, fever, night sweats, weight loss, and fatigue. Diagnosis relies on a combination of clinical evaluation, radiological imaging (such as chest X-rays), microbiological testing (including sputum smear microscopy, culture, and molecular assays), and, in some cases, biopsy of affected tissues. Early detection and diagnosis are essential in preventing disease progression, minimizing transmission, and improving treatment outcomes. The basis of TB treatment is a multidrug regimen consisting of antibiotics such as isoniazid, rifampicin, pyrazinamide, and ethambutol. Standard treatment for drug-susceptible TB typically involves an intensive phase followed by a continuation phase, lasting a total of six to nine months. However, the emergence of drug-resistant strains, including MDR-TB and extensively Drug-Resistant TB (XDR-TB), poses significant challenges to TB control efforts. Treatment of drug-resistant TB requires longer duration regimens, often with less effective and more toxic drugs, highlighting the urgent need for novel therapies and improved diagnostic tools.

Preventing the spread of TB relies on a combination of strategies aimed at reducing transmission, identifying and treating active cases promptly, and addressing underlying social determinants of health. Key prevention measures include vaccination with the *Bacillus Calmette-Guérin* (BCG) vaccine, which provides partial protection against severe forms of TB in children, and infection control measures such as airborne precautions in healthcare settings. Additionally, targeted screening and treatment of Latent TB Infection (LTBI) in high-risk populations can help prevent progression to active disease and interrupt transmission chains.

Despite significant progress in TB control efforts, numerous challenges persist in fighting against the pulmonary TB. These include inadequate funding, weak healthcare systems, stigma and discrimination, barriers to accessing care, and the complex interaction of social, economic, and political factors. However, amidst these challenges lie opportunities for innovation, collaboration, and collective action. Advances in molecular diagnostics, novel treatment regimens, and vaccine development offer hope for more effective TB control strategies. Moreover, addressing the social determinants of TB, such as poverty, malnutrition, and inequitable access to healthcare, is essential in achieving meaningful and sustainable progress towards TB elimination.

Pulmonary tuberculosis remains a formidable global health challenge that demands sustained attention, resources, and commitment from the international community. By addressing the complex interaction of biomedical, social, and structural factors, we can strive towards a future where TB is no longer a leading cause of morbidity and mortality. Through collective action, advocacy, and innovation, we can turn the tide against TB and ensure a healthier, more equitable world for all.