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CHAPTER 1

Tuberculosis – A Social Disease with Medical Aspects

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused predominantly by an acid-fast bacillus - Mycobacterium tuberculosis [1]. TB has been acknowledged as a major public health concern owing to its capacity to cause ill-health among millions of people each year, and currently it ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV) [2].

Clinically, TB is classified into two types, namely pulmonary TB and extra-pulmonary TB. Further, pulmonary TB in itself is of two types – sputum positive and sputum negative TB [3]. A sputum positive TB patient constitutes the most important source of infection as the disease is mainly transmitted through droplet nuclei generated during coughing, sneezing etc., and inhaled via the respiratory route [3,4]. Although, not all individuals infected with M. tuberculosis will develop TB disease, however, the probability of developing TB is dependent upon multiple epidemiological determinants like age, gender, socio-economic class, environmental attributes (viz. overcrowding, ventilation, etc.), duration of exposure, frequency of exposure, and immune status of the exposed individuals [1,4].

Globally, the gold standard technique for establishing a confirmatory diagnosis of pulmonary TB is through sputum smear microscopy, in which the existence of the causative organism in a sputum sample is confirmed under the microscope by a trained laboratory technician [5]. However, over the years multiple other diagnostic tests, including molecular tests have been employed in different settings owing to the emergence of different types of drug-resistant TB [1,2].

From the treatment perspective, four first-line drugs (viz. isoniazid, rifampicin, ethambutol and pyrazinamide) are still being prescribed for treatment of a majority of newly-diagnosed TB cases [1]. In addition, for the treatment of drug-resistant forms of TB, multiple second / third line drugs have been utilized with variable extent of success owing to the longer duration of treatment, compliance issue, programmatic support, and adverse drug reactions [1,4,5]. Furthermore, the role of sustained political commitment, family support, continuous motivation of the patient during the course of treatment, ensuring user-friendly health care services, effective doctor-

patient communication, contribution of the outreach workers, and awareness among the members of the society remains crucial in reducing the magnitude of disease and improving the treatment success rate [5,6]. Finally, surgical options also exist for the management of appropriate patients. Despite many technological advances on the diagnostic and therapeutic fronts for management of TB, the search for an effective vaccine to prevent the disease in adults still goes on. [2,6].

EPIDEMIOLOGICAL DISTRIBUTION OF TUBERCULOSIS – GLOBAL AS WELL AS INDIAN SCENARIO

The burden of disease caused by TB is generally measured in terms of incidence (defined as the number of new cases of TB diagnosed within a specified time-interval, usually one year), prevalence (defined as the total number of TB cases at a given point in time) and mortality (viz. total number of deaths caused by TB within a specified time-interval) [2,7]. Globally, on an average every second a person is infected with TB and every 10 seconds someone dies as its sequel [8]. In-fact, a single case of untreated smear positive TB can transmit the infectious agent to 10-15 persons each year [6,8].

Worldwide, in the year 2012 alone, almost 8.6 million new cases of TB were diagnosed while approximately 1.3 million people (viz. 0.94 million in HIV-negative and 0.32 million in HIV-positive) succumbed to the disease or its associated complications [2]. In-fact, the South-East Asia and Western Pacific regions together contributed for approximately 60% of TB cases in the year 2012 [2]. Regardless of the fact that, most of the TB cases and associated mortality was reported among men, but even among women (0.41 million) and children (0.074 million) TB related deaths were reported [2]. In addition, a total of 0.094 million people were diagnosed and put on multi-drug therapy in the year 2012 which is roughly 42% more than the estimates in the year 2011[2].

India alone contributes the largest share (26%) among the newly diagnosed TB cases [2]. Even from the prevalence point of view India has a contribution of 1900000 cases in the global load [2]. Furthermore, in India each day more than 40,000 persons get infected with TB bacilli, more than 5000 people develop TB disease and more than 900 people succumb to the disease [6]. As far as drug resistant TB is concerned, India again ranks as one of the leading nations and is considered high-burden country [2]. These are enormous estimates from a public health perspective and hence it necessitates a sustained dedicated effort from the program managers / health professionals to persistently reduce the burden of the disease [1,2].

PREDICTORS FOR HIGH BURDEN OF TB IN INDIA

As already mentioned, the burden of TB in India is alarmingly high and similar trends have persisted for years together [1,2]. These estimates should be seriously looked upon as the nation is running a specific national program to combat the disease since the year 1962; the government and the policy makers are committed as revealed in rising budgetary allocation; expansion of the laboratory support to promote early diagnosis; availability of quality assured drugs; uninterrupted

supply of drugs; and the continuous and collaborative efforts of the general health system staff and the program staff [2,6,9].

The findings of multiple studies and other evaluation reports have identified multiple factors which have played a crucial role in contributing towards the high burden of the tuberculosis, namely

- Poor awareness among the community [7].
- Stigma associated with the disease [7].
- Absence of a streamlined advocacy, communication & social mobilization campaign across the nation [10].
- Limited involvement of all stakeholders [2].
- Inherent weaknesses in the public health care delivery system (viz. scarcity of healthcare professionals in remote parts of the country, untrained status of the health workers, no periodic sensitization regarding recent development, strict timings of the health care establishments) [11].
- Conflicts among the health workers regarding their job related roles / responsibility [6].
- Preference for the private health sector by almost 70% of the residents of country [12].
- Limited involvement of private health sector despite existence of multiple schemes to encourage the collaboration work [9].
- Delayed release of funds to the private sector / non-government organizations (NGOs) [6,9].
- Storage of drugs not according to the recommended guidelines [9].
- No efforts by the program managers to ensure availability of buffer stocks of drugs [13].
- Emergence of multiple drug-resistant tuberculosis [3].
- Augmentation in the number of HIV-TB co-infected cases [3].
- Long duration of treatment for the disease [6.13].
- Minimal orientation of future doctors (undergraduate medical students) during their medical curriculum [14].
- Limited number of sanctioned seats of post-graduation, especially in Chest Medicine and General Medicine [9].
- Minimal sensitization of the doctors from both public and private health sector [6].
- Poor knowledge and practices among the physicians regarding different aspects of TB [14].

- Deterioration in the doctor-patient relationship [14].
- Limited scope for incorporating patient and their family members views [1,2].
- Existence of multiple types of delay before patient is started with appropriate treatment [15,16].
- Non-compliance with the diagnostic and treatment algorithm [6,14].
- Widespread use of non-recommended diagnostic tests [17].
- Scanty number of accredited institutes that can provide reliable results [13].
- Over-the-counter sale of anti-TB drugs [14].
- Inadequate follow-up of patients leading to default and non-completion of treatment [1,2,6].
- Negligible attention for the need of psycho-social support to the patient / family members [6,7].
- Rapid increase in number of slums [6,7,9].
- No implementation of a framework to facilitate airborne infection control across all hospitals [18].
- Poor coordination among different districts / states for the transferred in / out cases [9].
- Poor monitoring and supervision mechanism [1,9].

VISION AHEAD: MILLENNIUM DEVELOPMENT GOAL-6

Recognizing the public health impact associated with TB, under the adopted Millennium Development Goal (MDG) -6, it was intended to halt the incidence of TB by the year 2015. However, the Indian estimates clearly suggest that the nation considerably falls short of their commitment towards achievement of MDG-6 [1,2]. The World Health Organization (WHO) as part of strengthening the existing range of services has earmarked five priority areas to accelerate the progress towards 2015 targets, namely:

Reaching Missed Cases

The annualized new sputum positive case detection rate in the country has gradually increased from 52% in 2000 to 68% in 2012. Nevertheless, concerted efforts are needed in order to further augment the case detection rate. Further, the case notification rate of additional TB cases (viz. smear negative or extra-pulmonary) is extremely low and again multiple cost-effective strategies have to be implemented to accomplish the target of detection of 90% of all forms of TB [19]. The program managers have been asked to mobilize their resources and motivate the outreach workers to go in the community and look for more and more cases. Also, to decrease the burden

on health officials / delay, a case-based web-based software - NIKSHAY – has been launched to facilitate online reporting [19]. In addition, suspect criteria for pulmonary TB have been expanded to subject more number of people to sputum testing, strategy of contact tracing, and establishment of a network to trace default patients, has also been implemented widely across the country [6,10].

Addressing Multi-drug TB (MDR-TB)

In order to prevent the emergence of drug resistant TB cases, special emphasis is given towards sensitization of the medical practitioners from both public & private health sector to follow the diagnostic and treatment algorithm [6,14]. In addition, restricting the sale of anti-TB drugs over-the-counter [9]; ensuring the compliance of treatment for the entire course of treatment [6,7]; expanding the diagnostic modalities [13,20]; increasing the number of accredited laboratories where the diagnosis of drug-resistant TB can be made [1,2,13]; and facilitating the participation of private sector / NGOs in different aspects of the program [6,10], can be tried upon to reduce the cases of MDR-TB.

Accelerating the response to TB/HIV

Owing to the persistent rise in number of TB-HIV co-infected cases, inherent challenges in the management plan, drug-interactions, adverse drug reactions, associated stigma with diseases, poor treatment outcomes, and high mortality rates; these co-infected patients are an extremely vulnerable group [1,2,6,7]. All these challenges essentially necessitate that the program managers of TB and HIV program should work in collaboration and strengthen the existing TB-HIV package of services [6,7,10,13].

Augmenting financial support

Acknowledging the life threatening nature of the disease, global distribution, high risk of transmissibility, need of sensitization of the health workers, and strengthening of infrastructure, the program should be financially supported by the policy makers while planning budgetary allocation [2,6]. In-fact, the monetary support will provide an adequate window for the program managers to try to implement customized strategies in special areas [2,13].

Adoption of innovations

Adoption of newer tools and strategies has been recommended to promote early diagnosis / treatment and improve treatment outcome. These strategies will be discussed in detail in Chapter 6. However, these innovations will provide anticipated outcome, only if the innovations are satisfactorily implemented at the grass root level in an integrated and evidence-based manner to achieve millennium development goal-6 [2,6].

CONCLUSION

To conclude, India is identified as one of the leading nations that accounts for a maximum

percentage of tuberculosis (including drug-resistant TB) cases worldwide. Thus, there is an indispensable need to implement cost-effective interventions on the nation-wide level to ensure reversal of this trend.

SUMMARY

Tuberculosis (TB) is an infectious disease caused predominantly by an acid-fast bacillus - Mycobacterium tuberculosis. Clinically, TB is classified into two types namely pulmonary TB and extra-pulmonary TB. The role of sustained political commitment, family support, effective doctor-patient communication, and awareness among the members of the society plays a crucial role in reducing the magnitude and improving the treatment success rate. Worldwide, in the year 2012 alone, almost 8.6 million new cases of TB were diagnosed of which India alone contributes for the 26% of cases.

The burden of TB in India is alarmingly high and these estimates should be seriously looked upon as the nation is running a specific national program to combat the disease since the year 1962; the government and the policy makers are committed as revealed in rising budgetary allocation; expansion of the laboratory support to promote early diagnosis; availability of quality assured drugs; uninterrupted supply of drugs; and the continuous and collaborative efforts of the general health system staff and the program staff.

Recognizing the public health impact associated with TB, under the adopted Millennium Development Goal (MDG) -6, it was intended to halt the incidence by the year 2015. However, the Indian estimates clearly suggest that the nation considerably falls short of their commitment towards achievement of MDG-6. The World Health Organization as part of strengthening the existing range of services has earmarked five priority areas to accelerate the progress towards 2015 targets, namely reaching missed cases, addressing Multi-drug TB, accelerating the response to TB/HIV, augmenting financial support, and ensuring timely adoption of innovations.

References

1. World Health Organization. Global Tuberculosis Control Report 2012. Geneva: WHO press; 2012.
2. World Health Organization. Global Tuberculosis Control Report 2013. Geneva: WHO press; 2013.
3. Lawn SD, Zumla AI . Tuberculosis. Lancet. 2011; 378: 57-72.
4. Atif M, Sulaiman SA, Shafie AA, Ali I, Asif M. Treatment outcome of new smear positive pulmonary tuberculosis patients in Penang, Malaysia. BMC Infect Dis. 2014; 14: 399.
5. Choi H, Lee M, Chen RY, Kim Y, Yoon S. Predictors of pulmonary tuberculosis treatment outcomes in South Korea: a prospective cohort study, 2005-2012. BMC Infect Dis. 2014; 14: 360.
6. TBC India. Managing the RNTCP in your area - A training course (Modules 1-4). New Delhi: TBC India. 2011.
7. Park K. Epidemiology of communicable diseases. Park K, editor. In: Text Book of Preventive and Social Medicine. 21st ed. Jabalpur: Banarsidas Bhanot Publishers. 2011; 164-181.
8. Lönnroth K1, Raviglione M. Global epidemiology of tuberculosis: prospects for control. Semin Respir Crit Care Med. 2008; 29: 481-491.
9. Shrivastava SR, Shrivastava PS, Ramasamy J. Modifications in the Revised National Tuberculosis Control Program to achieve universal access to tuberculosis care. CHRISMED J Health Res. 2014; 1: 45-47.

10. TBC India. Managing the RNTCP in your area - A training course (Modules 5-9).

11. Shrivastava SR, Shrivastava PS, Ramasamy J. Implementation of public health practices in tribal populations of India – Challenges & Remedies. Healthc Low-resour Settings. 2013; 1: e3.

12. Ministry of Health and Family Welfare (2006) National family health survey (NFHS-3), 2005-06.

13. TBC India. Guidelines for PMDT in India. New Delhi: TBC India. 2012.

14. Shrivastava SR, Shrivastava PS, Ramasamy J. Knowledge and practices about Revised National Tuberculosis Control Program among clinicians of a medical college in India: A cross-sectional study. Prog Health Sci. 2013; 3: 94-103.

15. Asefa A, Teshome W. Total delay in treatment among smear positive pulmonary tuberculosis patients in five primary health centers, Southern Ethiopia: A cross-sectional study. PLoS One. 2014; 9: e102884.

16. Storla DG1, Yimer S, Bjune GA . A systematic review of delay in the diagnosis and treatment of tuberculosis. See comment in PubMed Commons below BMC Public Health. 2008; 8: 15.

17. World Health Organization. Commercial serodiagnostic tests for diagnosis of tuberculosis, 2011. Geneva: WHO press. 2011.

18. TBC India. Guidelines on airborne infection control in healthcare and other settings. New Delhi: TBC India. 2010.

19. TBC India. NIKSHAY. New Delhi: TBC India. 2012.

20. TBC India. RNTCP-FIND-WHO CBNAAT Project. New Delhi: TBC India. 2012.