



Epidemiology of Tuberculosis and Drug Resistance in Tuberculosis Treatment in Indian Patients

Patil JS*

VT's Shivajirao S Jondhle College of Pharmacy, Thane, Maharashtra, India

Introduction

Tuberculosis (TB) is a ubiquitous, highly fatal contagious chronic granulomatous bacterial infection. It is mainly an infection of the lungs, but can affect almost any part of the body. Although TB is a preventable and treatable disease, yet it still poses a significant threat globally. Approximately, nine million new cases and one-and-a-half million TB-related deaths occur each year; the incidence may vary. In 2012, an estimated 8.6 million people developed TB and 1.3 million died from the disease.

TB is caused by the human pathogen *Mycobacterium tuberculosis* (MTB) an infectious human agent. MTB may have killed more persons than any other microbial pathogen. The inadequacy of awareness and treatment results in major health problems, where the results are complicated [1-4].

TB a ubiquitous, highly contagious chronic granulomatous bacterial infection is still a leading killer of young adults worldwide. TB has returned with a new face and the global scourge of multi-drug resistant TB (MDR TB) is reaching epidemic proportions. TB is treated with a multi-drug regimen, and is thus exceptionally vulnerable to incidences of side effects, unsatisfactory patient compliance and slow improvement of patients. The duration of treatment and the pill burden are creating patient non-compliances though potentially curative pharmacotherapies are being available for over 50 years. Thus, multi-drug-resistant (MDR) strains are being developed due to low compliance and adherence to administration schedules and ultimately leading to therapeutic failure. Hence, MDR TB has the capability of surviving intracellularly in the host macrophages for long period of time [5]. Therefore, the ability of the antibacterial agent to sterilize the microorganisms within the macrophage is of key importance. However, most of the anti-mycobacterial drugs presently in use fail to penetrate macrophages. For this reason, many researchers are considering the use of appropriately engineered delivery systems for these drugs, in order to make them therapeutically effective [6].

Epidemiology of tuberculosis:

In near future, an increasing morbidity and mortality occurs in the treatment of TB. The proportion of TB cases co-infected with Human Immunodeficiency Virus (HIV) was also found to be rising. The association with HIV and increasing Multi Drug Resistant Tuberculosis (MDR-TB) appears to be a serious issue, especially for the developing nations.

TB situation in an area is conveniently measured in terms of three incidence such as death among the known cases, prevalence and incidence of infection, prevalence of disease. Most adverse outcome is the death from TB. Occurrence of death is the first of the indices to decline in the secular curve of a tuberculosis epidemic, followed by morbidity and infection in that order [7,8]. Though death has ceased to be significant epidemiological information for the most advanced countries, it could still possibly be a measure of the extent of the most visible success of at least the anti-TB programme delivery and its management, in the developing countries [9].

Accurate estimation of prevalence of infection in those aged 14 years or more in the Indian context is difficult. Failure to demarcate the infected from the non-infected due to high prevalence of intermediate reactors in India in older ages, does not allow prevalence of infection among the unvaccinated subjects, to be a sensitive indicator [10]. In fact incidence of infection as studied in younger age groups is the appropriate index to measure the tuberculosis situation in a community. In Indian context TB is not considered to be a notifiable disease and hence routine health data have not served as the source of information for estimating the disease state in the community.

Drug resistance

Nearly eighty percent of MTB cells from the infected cavity have been eradicated with the help of two most important drugs namely rifampicin (RIF) and isoniazid (INH). RIF is bactericidal and has a sterilizing activity for MTB. INH is also bactericidal against the replicating bacteria and is the most widely used first-line anti-TB drug. Pyrazinamide (PZA) is used along with INH and RIF. It helps in clearing the MTB cells in the initial phase only. It is weak bactericidal agent, but effective against bacteria in acidic environments. On the other hand, ethambutol (EMB) is bacteriostatic and is used in combination with above three drugs. This combination prevents the emergence of drug resistance [11]. The moment an MTB isolate becomes resistant to RIF and INH; it takes the shape of a serious health hazard for the public. This is because the patients with MDR-TB are a constant source of transmission of MDR MTB [12].

To know the drug resistance pattern for these four drugs a survey was conducted by the Central Tuberculosis Division through National Institute for Research in Tuberculosis (NIRT), in the state of Gujarat. A total of 1,571 isolates from new patients were taken, in which 78.7% were susceptible to all first-line drugs, 11% had INH resistance and MDR-TB was found in 2.35% [13]. Inadequate treatment leads to a serious and life-threatening illness, that is, it results in a constant increase in the proportion of MDR-TB as well as XDR-TB.

Conclusion

Epidemiology of TB in India is being monitored through organizing routine reporting and mainly through Revised National Tuberculosis Control Programme (RNTCP). This programme needs to be used as an effective instrument to bring a change in epidemiological situation,

*Corresponding author: Patil JS, VT's Shivajirao S Jondhle College of Pharmacy, Thane, Maharashtra, India, Tel: 09594962017; E-mail: pharmajspatil@gmail.com

Received July 15, 2015; Accepted July 20, 2015; Published July 22, 2015

Citation: Patil JS (2015) Epidemiology of Tuberculosis and Drug Resistance in Tuberculosis Treatment in Indian Patients. Adv Pharmacoepidemiol Drug Saf 4: e132. doi:10.4172/2167-1052.1000e132

Copyright: © 2015 Patil JS. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

through fast expansion and achievement of global target. It is also essential to note that all the effective measures are to be implemented, to manage both the fresh and MDR-TB cases by following the five major strategies under Directly Observed Treatment Short course (DOTS) for a better and healthy population and convince the patients to take the prescribed drugs on a routine basis, without any discontinuation.

References

1. Patil JS, Sarasija S (2012) Pulmonary drug delivery strategies: A concise, systematic review. Lung India 29:44-49.
2. Kalo D, Kant S, Srivastava K, Sharma AK (2015) Pattern of drug resistance of Mycobacterium tuberculosis clinical isolates to first-line antituberculosis drugs in pulmonary cases. Lung India 32: 339-341.
3. Krutzik SR, Modlin RL (2004) The role of Toll-like receptors in combating mycobacteria. Semin Immunol 16: 35-41.
4. Patil JS, Devi VK, Devi K, Sarasija S (2015) A novel approach for lung delivery of rifampicin-loaded liposomes in dry powder form for the treatment of tuberculosis. Lung India 32: 331-338.
5. Patil JS, Sarasija S (2009) Physicochemical characterization, *in vitro* release and permeation studies of respirable rifampicin-cyclodextrin inclusion complexes. Indian J Pharm Sci 71: 638-643.
6. Patil JS, Devi VK, Devi K, Sarasija S (2015) Formulation and Evaluation of Novel Spray-dried Alginate Microspheres as Pulmonary Delivery Systems of Rifampicin in Rats. Indian J Pharm Edu Res 49: 320-328.
7. Grigg ERN (1958) The arcana of tuberculosis. With a brief epidemiologic history of the disease in the USA. Parts I and II. Am Rev Tuberc Pulm Dis 78: 151-172.
8. Grigg ERN (1958) The arcana of tuberculosis. With a brief epidemiologic history of the disease in the USA. Part III. Epidemiologic history of tuberculosis in the United States. Am Rev Tuberc Pulm Dis 78: 426-453.
9. Chakraborty AK (2004) Epidemiology of tuberculosis: Current status in India. Indian J Med Res 10: 248-276.
10. Styblo K (1990) The elimination of tuberculosis in the Netherlands. Bull Int Union Tuberc Lung Dis 65: 49-55.
11. Blumberg HM, Burman WJ, Chaisson RE, Daley CL, Etkind SC, et al. (2003) American Thoracic Society, Centers for Disease Control and Prevention and the Infectious Diseases Society of America. American Thoracic Society / Centers for Disease Control and Prevention / Infectious Diseases Society of America: Treatment of tuberculosis. Am J Respir Crit Care Med 167: 603-662.
12. Mokrousov I, Narvskaya O, Limeschenko E, Otten T, Vyshnevskiy B (2002) Detection of ethambutol - resistant Mycobacterium tuberculosis strains by multiplex allele-specific PCR assay targeting embB306 mutations. J Clin Microbiol 40: 1617-1620.
13. Menon S, Dharmshale S, Chande C, Gohil A, Lilani S, et al. (2012) Drug resistance profiles of Mycobacterium tuberculosis isolates to first line anti-tuberculous drugs: A five years study. Lung India 29: 227-231.