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Tuberculosis: How to Control the Scourge

Anantha Naik Nagappa*, Vinuth Chikkamath, Ramesh Basnet, Asmit Acharya, Vaishnavi Naik and Sucharitha K

Department of Pharmacy Practice, SCS College of Pharmacy, Harapanahalli-583131, Karnataka, India

***Corresponding Author:** Anantha Naik Nagappa, SCS College of Pharmacy, Harapanahalli-583131, Karnataka, India.

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Abstract

Tuberculosis (TB) is emerging all across the globe is like a wild fire. Tuberculosis has emerged as a smart disease of the modern times. TB has metamorphosed into multidrug resistant (MDR), Extensive drug resistant (XDR), and Total drug resistant (TDR). Its partnership with HIV has made it most infectious especially with Bovine TB. The new TB strings are difficult to treat with routine medications. The vulnerability of human race is all time high due to unhealthy life style modifications with involvement in junk foods. Hence, it becomes all the important to strengthen public health system and preventive measure as currently it appears the medicines are unable to contain the spread of TB and other forms of TB. In this article the show case in Indian model by community pharmacist who adapted WHO Directly observed short term course strategy (DOTS). The results were astonishingly encouraging and indicating of future strategies of combating chronic diseases.

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Introduction

TB is an infectious disease primarily infecting the lungs. However, can infect any part of the body where there is a rich flow of blood and with high oxygen content like kidneys, brain, bone etc. TB mainly spread through droplet infection from person to person. When a patient coughs in the open air, the aerosol containing TB organisms are aerosol in the atmosphere. In case, healthy person inhale this droplet is likely to be getting infected. However, it is certain that when a healthy individual very close to TB patient is like to get the TB infection. It is also important to know the difference between the infection of TB and the TB disease. TB microorganisms lodged in the lungs remains alive for several decades before it develops into active TB. The immune system of the infected individual does not allow the TB to growth into activity. However, the immune system also protects the TB organism from the eradication. The TB microorganism is an intracellular bacillus, which usually takes shelter in the macrophages of the lungs, which lives in silence and waits for weaken of the immune system. When the immune system becomes the weaken, the TB organism develops into active TB disease that's why the people with weakened immune systems like HIV/AIDS, patients receiving the cancer chemotherapy or children five-years-old are at a great risk of developing the active TB diseases. TB disease takes few days to weeks to develop into active TB disease following the active disease [1-3].

Symptoms of active TB disease include persistent cough, loss of appetite, fever, chills and night sweat, loss of body weight and also may include symptoms related to the function of specific an organ or system the TB has affected. Example, a person with active lung TB can cough blood in sputum. If bone is affected there will be a continues dull pain in the bones. It is estimated that 1:3 persons are infected

a TB, who are termed as persons with latent TB meaning, the immune system of these persons are not allowing the bacteria to grow and develop into an active disease.

The risk factors for getting TB infection are those two people who are having the active TB disease who are family and friend, persons who have emigrated from nations where high rates of TB is identified. It is also risky of the high rate of transmission in homeless persons, drug abusers using injections and people living with HIV infections. People with chronic conditions such as diabetes, kidney disease and the people who are undergoing the organ transplanted. People receiving immune suppression treatment for autoimmune disease like Rheumatoid arthritis and Crohn's disease. The people who reside in facilities and an institution that has high risk for TB, such as hospitals, homeless shelters, residential homes for HIV. It was reported that the high prevalence of TB was observed in the United Kingdom theater goers. It was realized that in theater drama is played in the night times has little exposure to sunlight, as theater is a closed entitle if a TB patient coughs there he used to leave aerosol which in TB microorganism in the air. It is known that TB microorganism can survive in dark environment where no sunlight enters. On the contrary change in the public entertainment from drama to cinema. The cinema theaters in developing countries like India, Indonesia, China, Philippines, Pakistan, Nigeria and South Africa are theater are overcrowded and they may be an active site for the spread of TB infections among the cinema goers.

Case Study Tuberculosis in India

India is most populated country having the representation of multicultural, socioeconomic demography. By study the epidemiology of the disease makes with a sense as it would be a true representative of global model. Hence, we discuss the disease pattern and its spread, development resistant restrain like MDRTB, XDTR TB and TDR TB. Its partnership with AIDS is well pronounced in Indian subcontinent.

In India, each year 22 lakhs deaths reported due to Tuberculosis. The disease is costing Indian economy the 40 billion US dollars for 10 years. It is emerging as a major health problem and answer is not in the medicines but intelligent medicine management. For the medicine management, there is the need of the well-trained health care provider closely works with patients in the ambulatory care and community care. The pharmacists are available in government and private sector to tackle the challenges of Tuberculosis. The involvement of the Pharmacist is key to achieve is required to the patients compliance. This stagey has worked miraculous outcomes in the Maharashtra state. Brief training in the skills for the pharmacist should be able to contain the morbidity and mortality of all kinds of Tuberculosis.

India, is on the top of the list of the Nation in the global Tuberculosis (TB) report 2017 released by the World Health Organization (WHO). In 2016, the global estimation of new TB cases stood at a staggering of 1 crore 4 lakh. The TB was very prevalent in seven countries which are accounted for 64% global burden. The countries are India, Indonesia, China, Philippines, Pakistan, Nigeria, and South Africa. In 2016, there were around 28 lakh patients in India were suffering from TB. Among these, 4.25 lakh were estimated to have died in 2016. The countries listed above are highly populated with low quality of life, and are having low human index. The TB is getting into transformed into very difficult kind of TB, by acquiring the resistant like Multi-drug-resistant tuberculosis (MDR-TB) and extensively drug-resistant TB (XDR TB). It is very disheartening despite of availability of excellent medicines, it is not possible to control the number of cases are contain the conversation of the normal TB to MDR-TB and XDR-TB [4-7].

Diagnosis and Treatment

The strategy for preventing TB is to take a daily dose of 10 to 15 mg/kg/day once daily (maximum dose: 300 mg/day) or 20 to 30 mg/kg/dose twice weekly (maximum dose: 900 mg/day) of Isoniazid for 6-9 months. There are additional drugs which are also important in the management of TB and prevention, conversation of normal TB into MDR/XDR. The vaccine against TB called as Bacillus Calmette-Guerin (BCG) which is used to prevent the development of active TB disease. It can also be used to diagnose the TB disease, in which the attenuated microorganism of the TB are injected into the skin is known as Tuberculin test. The TB vaccine is found to be very effective in reducing the incidence of TB in children but doesn't have that much of effectiveness in adults. TB can be diagnosed either by the skin test or blood test. In the skin test, a small amount of tuberculin fluid injected into the skin in the arm within two- three days if

there is a bump or thickening it is indication whether one has positive or negative after measuring the bump or thickening by the health care worker. Whereas, in the blood test the blood sample is tested with antigens of TB microorganism, if there is an antigen-antibody reaction on a glass slide it indicates the positive of TB disease. However, these test unable to confirm that the person has developed clinically active TB disease for confirmation of clinically active TB disease. One should examine the sputum or chest X-ray.

The anti-tuberculosis treatments are usually multidrug resistance, due to the fact that the treatment of the TB with single drugs leads to the emergence of a resistant strain. The Multidrug therapy usually comprises of 4 drugs Isoniazid, Pyrazinamide, Rifampacin, Ethambutnol for first 2 months and continued the treatment with isoniazid and Rifampacin for another 4 months within 2 months the treatment of 4 drugs change the infectious TB into Noninfectious stage i.e. the patient becomes sputum negative and cannot infect other persons and during the period of 4 months the remaining bacteria get eradicated and thus rendering the complete cure of the patients this treatment success is based on Directly Observed Tuberculosis Short Course (DOTS) strategy of WHO.

The emergency of the MDR TB has made it rely on the second line of drugs which are less potent and more toxic. The search for new drugs has yielded a new to new drugs Bedaquiline and Delamanid is two drugs belonging to the chemical class of Diary quiniloline and Nitro imidazole respectively. The Bedaquiline acts by inhibiting the bacterial ATP synthase whereas the Delamanid inhibits the synthesis of cell wall components of mycobacterium tuberculosis. Linezolid an oxazolidine 1 anti biotic is also an important anti TB drug for the treatment of MDR TB. Antibacterial agents like Carbapenems in combination with Clvualanate are considered for treatment of MDR TB. With availability of new drugs for TB new regimens are proposed. Fluroquinolines, especially moxiflocillin with pyrazinamide against MDR TB considered. Bedaquiline plus pyrazinamide and Bed aquilline plus pretomeanide is being tried. Bedaquiline plus pretonamide plus linzolide is considered for patients with XDR TB [8,9].

Rntcp – India

In India, the available information from the several drug resistance surveillance studies conducted in the past suggest that the rate of MDR-TB is relatively low in India. However, this translates into a large absolute number of cases and as yet the management of patients with MDR-TB is inadequate. Specific measures are being taken within the Revised National Tuberculosis Control Programme (RNTCP) to address the MDR-TB problem through appropriate management of patients and strategies to prevent the propagation and dissemination of MDR-TB.

The globally, India share of TB patients accounts for $1/4^{th}$ patients with many of these patients having Multi-drug-resistant tuberculosis (MDR-TB) and Extensively drug-resistant TB (XDR TB). The studies on the literature various groups across the country indicate that the TB is spreading across the country despite efforts by government by RNTCP which was introduced in 1962. The spreading of TB among HIV patients and immune compromise patients and another added facet of renewed catastrophe. The key to the success of the TB control is effective therapeutic management of tuberculosis World Health Organization strategy is DOT plus although effective are unable to curtail the spread of infection across the country. It is estimated 14 lakhs people are diagnosed active TB every year. The problem in the medication therapy of TB is the lack of supervision for the entire course of treatment which is nearly six months. Initially, the patients show a high level of compliance until the bother morbidity haunts the patients. As the time goes on the morbidity of the diseases vanish and at this juncture patient who will decide upon not to continue with the therapy as he feels uncomfortable by the adverse drug effects of the anti tuberculosis drug. This gives the opportunity for the bacteria to emerge as multi drug resistant tuberculosis. There is a need for dedicated primary health care worker who supervises the patient taking the medicines for the entire six months. Hence, there is a need of one trained primary health care worker to document and find out which patients have stopped the medication in the mid of the treatment course. The Maharashtra Chemist and Druggist have taken up this challenge and in fact were successful in curing the TB by active supervision of DOTS programme. Some of the observations of this committee were (i) less than 30 percent treatment completion; (ii) inadequate budgetary outlay and shortage of drugs; (iii) undue emphasis on x-ray diagnosis; (iv) poor quality of sputum microscopy; (v) emphasis on case detection rather than cure; (vi) poor organization setup and support for TB; and (vii) multiplicity of treatment regimens [12].

Sl. No.	Type	Site of infection
1	Pulmonary Tuberculosis	Lungs
2	Extra pulmonary Tuberculosis	Pleura, CNS, Genito urinary, lymphatic, bones and joints

Table 1: *Shows the site of infection of TB in different organs.*

Core drugs	Dose	Side effects	Duration of treatment
Isoniazid	5 mg/kg oral (maximum 300 mg)	Hepatitis, peripheral neuritis, drug induced lupus, seizures, and hypersensitivity with rash and fever. Drug interactions with dilantin and disulfiram	900 mg twice weekly 600 mg thrice weekly for 6 month
Rifampicin	10 mg/kg oral (maximum 600 mg)	Orange body secretions, flu-like syndrome, hepatitis, thrombocytopenia, nausea, anorexia, diarrhoea, renal failure, and multiple drug interactions	10mg/kg,600 mg twice weekly, 600 mg thrice weekly for 4 month
Pyrazinamide	25-30 mg/kg oral	Hyperuricemia, hepatitis, rash, nausea, and anorexia	30-35 mg/kg for first 2 month in combination
Ethambutol	25 mg/kg initial 2 months, then 15 mg/kg oral	Optic neuritis and gastrointestinal discomfort	50 mg/kg twice weekly 30 mg/kg thrice weekly for 6 month

Table 2: *List of drugs used in the treatment of Tuberculosis.*

Conclusion

Tuberculosis, although an ancient disease haunts mankind by changing its strategies like extra pulmonary TB, MDR-TB, XDR-TB and TB with AIDS. Currently, it seems we have the drugs which can eradicate the TB in an infected person. However, practically it is proving to be a very difficult task. It is very clearly no drugs alone can cure TB. Along with the drugs patients compliance and motivation to complete the six months drug therapy is mandatory condition. This requirement of motivation and compliance is playing a major role in the spread of TB across the country. Maharasthrian Chemist and Druggist participation in DOTS leading to the success of combating the TB is an indicator of the role of the Pharmacist in improving the patient compliance and efficacy of treatment. There should be call all across the country the Pharmacist and Community Pharmacist begins dispensing, documenting and supervising the Anti tuberculosis drugs for the patients in the community pharmacy/retail pharmacy and outlets.

The TB disease manifestations include multidimensional impact such a patient's family, community, and as well nation. TB has emerged as a silent killer unlike other infectious diseases. Its collaboration with HIV and acquiring the resistance is the mutualism for the eradication of the diseases. Its effect on economic and social life is aiming crucial increasing the morbidity and mortality of the nation. Its ability to survive in the human lungs and emerge as active TB is another challenge the latent TB microorganism as an active TB when the immune response weakens. The immune response downgrades in poor nutrition status. Poor nutrition is due to poverty, ignorance and HIV infection. Hence, it becomes a vicious cycle of emergency of the variety of TB in the society. To put a halt on this growth of TB there is a need for the multi action like patient education, compliance, availability and accessibility of anti tuberculosis drugs. Management of health status is some of the essential stuff to put a halt for the spread of tuberculosis.

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