

RESEARCH ARTICLE

MARKET SURVEY OF ANTITUBERCULOSIS DRUGS IN INDIA

*Ashish Pandey, Satish Kumar Sharma, Lalit Singh, Tanuja Singh
Sunder Deep Pharmacy College, Ghaziabad, UP, India

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ABSTRACT

Tuberculosis (TB) is a contagious disease. It is worldwide occurring disease affecting millions of people. A WHO report in 2011 show that almost 8.7 million people is in apprehension of Tuberculosis. Tuberculosis commonly affects to lungs but other body part is also susceptible to develop tuberculosis viz. brain, bone, spine, kidney, lymph node. *Mycobacterium tuberculosis* a gram positive bacteria is responsible for this contagious disease. Streptomycin is the first drug invented to treat tuberculosis. Some other also useful anti-tuberculosis drugs are invented like isoniazid, ethambutol, rifampin, pyrazinamide. Due to noncompliance and other reasons drug resistance should be developed in patients then other drugs come in addition like gatifloxacin, ethionamide, aminosalicylic acid, cycloserine, amikacin etc but these drugs have high toxic effects than first line drugs. WHO begun a programme to fight against tuberculosis named DOTS (Directly Observed Treated, Shortcourse). This study approved that the selling of first line drugs viz. ethambutol, isoniazid, rifampin, pyrazinamide and their combination is more than the second line drugs in India.

KEY WORDS: Gatifloxacin, Ethionamide, Aminosalicylic Acid, Cycloserine, Amikacin.

INTRODUCTION:

Tuberculosis is a severe airborne infection of human and animals caused by tubercle bacillus or *Mycobacterium tuberculosis*. Tuberculosis characterize by formation of tubercles in lungs and other tissues of body viz. brain, bone, spine, kidney, lymph node etc. In tuberculosis bacteria reaches to alveoli. Alveolar macrophages endeavour to kill bacilli; some degree of extent they succeed and some degree of extent they were failed. So, remaining bacilli multiplied and leads to tuberculosis.^[2,8]

Tuberculosis abbreviated as TB. Tuberculosis has been on the rise in tandem with HIV/AIDS. This is because people with HIV/AIDS, whose immune systems are weakened have with a 20–37 times the risk of developing a progressive disease compared with HIV-negative individuals.^[4]

EPIDEMIOLOGICAL DATA:

The latest estimation of TB included in WHO report that there were almost 8.7 million new cases in 2011 and 1.4 million TB deaths (990, 000 among HIV negative people and 430, 000 HIV-associated TB deaths).^[4]

Rates per 100,000 people in different areas of the world where: globally 178, Africa 332, Americas 36, Eastern Mediterranean 173, Europe 63, Southeast Asia 278, and Western Pacific 139 in 2010. 2 million new cases of TB

in India had made the largest total incidence. The TB death rate dropped 41% between 1990 and 2011.^[1]

Death per 100,000 population in some countries are- Sierra Leone(159), Cambodia(63), Zimbabwe(47), Bangladesh(45), India(24), Russian federation(16), Ghana(8), Malaysia(6), Sri Lanka(5), Brazil(3), UK(1), Australia(0) and Canada(0).^[1,4]

PATHOGENESIS:

Infection occurs when a person inhales to droplet nuclei containing *M. tuberculosis* reach to alveoli of lungs. The macrophages engulf to bacilli and destroyed but few of them multiply intracellularly and released when macrophage dies. Then these microorganism spread in body through bloodstream and lymphatic channels. This bacilli reaches to part of body more likely to develop like brain, larynx, lymph node, spine, kidney, bone. Within 2-8 weeks special immune cells called macrophages surrounds bacilli and form a barrier called granuloma who controls bacilli. But these immune cells cannot keep control to bacilli so they multiply and develop TB.^[7,8]

SIGN AND SYMPTOM:

TB mostly affects to lungs and at primary stage patient feels flu like illness.

- A cough lasting for more than 2-3 weeks
- Chest Pain
- Chills

- Discolored or bloody sputum
- Fatigue
- Loss of appetite
- Night sweats
- Pain with breathing
- Severe Headache
- Shortness of breath
- Slight fever
- Tiredness or weakness
- Weight loss.^[5,6,8]

CAUSES & MODE OF TRANSMISSION:

The causative agent is *Mycobacterium tuberculosis* in human and *Mycobacterium bovis* in animals. Tuberculosis is transmitted mainly by droplet infection and droplet nuclei generated when a patient who has tuberculosis coughs. Tuberculosis is not transmitted by fomites, such as dishes and other articles used by the patients.^[7]

DIAGNOSIS:

The identification and determination of nature of illness is known as diagnosis. TB diagnosis includes-

1. **chest x-ray:** The X-ray of chest shows white spot in the lungs where immune system has walled off TB bacteria.
2. **sputum examination:** Sputum (the mucus comes up when cough) tested for TB bacteria. Bacteria present in sputum. These bacteria also use for drug resistance of TB.
3. **skin test:** a substance called tuberculin is injected below the skin in forearm. Within 48 to 72 hours healthcare professional check swelling at injection site; a hard raised red bump appeared.
4. **blood test:** This test is used to confirm that latent or active type of tuberculosis.^[15]

RISK FACTOR:

- Aging
- Alcoholism
- Crowded living conditions
- Diseases that weaken the immune system
- Health care workers
- HIV infection
- Homelessness
- Low socioeconomic status
- Malnutrition
- Migration from a country with a high number of cases
- Nursing Homes
- Unhealthy Immune System
- Use of drugs for Arthritis.^[16]

DIFFERENT TYPES OF TB:

TB categorizes into followings

1. **pulmonary tb:** active TB disease in lungs.^[5]
2. **extra pulmonary tb:** TB anywhere else in body viz. brain, bone, kidney, abdominal etc.^[6,9,13,14]
3. **latent tb infection:** not active disease, some bacilli in the body.^[10]

PREVENTION:

Preventive measures include

- A vaccine "BCG", is available
- Immune system might be keep healthy by eating healthy food
- Exercise regularly for good health
- Adequate amount of sleep
- Covering of mouth is also a beneficial measure
- The WHO recommends that HIV positive people who have latent TB should be offered isoniazid preventive therapy as needed.^[7,8,15]

TREATMENT:

TB can be cured by different antibiotics. Some of the safer and effective antibiotics have developed. Drugs used in the treatment of TB divided into two groups:

1. **first line:** The greatest level of efficacy and acceptable degree of toxicity viz. Isoniazid, ethambutol, rifampin, streptomycin and pyrazinamide.^[7,8]
2. **second line:** Because of microbial resistance it become necessary to add second line drugs viz. moxifloxacin or gatifloxacin, ethionamide, aminosalicylic acid, cycloserine, amikacin, kanamycin, capreomycin, and linezolid.^[7,8]

In HIV-infected patients receiving Protease inhibitors or Non-nucleoside reverse transcriptase inhibitors. The patient should take his/her pills under the guidance of someone who can supervise the therapy. The approach is called DOTS (Directly Observed Treatment, Short Course). Medication is failed to overcome TB then surgery of lungs should be option to cure disease.

COMPLICATIONS:

DEVELOPMENT OF DRUG-RESISTANCE TB:

Anti-tuberculosis (TB) drug resistance is a major public health problem that threatens progress made in TB care and control worldwide. Drug resistance arises due to improper use of antibiotics in chemotherapy of drug-susceptible TB patients. This improper use is a result of a number of actions including, administration of improper treatment regimens and failure to ensure that patients complete the whole course of treatment. Essentially, drug resistance arises in areas with weak TB control programmes. According to fourth global report of WHO from 2002 to 2006, a new case of TB resistance to at least single Antituberculosis drug is 17%, Isoniazid resistance is

10% and Multi Drug Resistance is 3%. A patient who develops active disease with a drug-resistant TB strain can transmit this form of TB to other individuals. Long term damage to lungs. Organ damage, joint damage & eye problems.^[8,11,12]

MATERIALS AND METHODS:

We visited to hospitals and consulted doctors. We found that the most patient of TB are suffering from pulmonary TB. They have the problem of coughing, chest pain, shortness of breath, severe headache, loss of appetite, weakness. A thorough survey of prescribing Anti-TB drugs was carried in the different city hospitals of National Capital Region (NCR), India. The market survey exist that the doctors prescribed first line drugs (isoniazid, ethambutol, rifampin, pyrazinamide etc) of TB and their combination are more than the second line drugs (gatifloxacin, ethionamide, aminosalicylic acid etc) of TB.

RESULT:

Sr. No.	Drug	1	2	3	4	5	6	7	8	9	10	Total	%sale
1	Ethambutol (combutol)	20	20			30	20		20		40	150	40
2	Ethambutol, Isoniazid (myconex-600)			20	30	40	10		30		20	150	40
3	Prothinamide (Prothicid)		30					20				50	30
4	Pyrazinamide (pyzina)	20	30					30	20		20	120	30
5	Rifampin, Ethambutol, Isoniazid, Pyrazinamide (akurit-3)	10	30	28			20			30	20	138	40
6	Rifampicin, Ethambutol, Isoniazid (akt-3)	20		40	30	20				20	40	170	40
7	Ethionamide (ethide)				20	10		20			30	80	40
8	Isoniazid (ipcazide)	20	10				30		20			80	30
9	Rifampicin, isoniazid. (gocoxcompoun)			30	20		20		10	20		100	30
10	Ethambutol, isoniazid. (combunex)	20	30					20			20	90	30
11	Pyrazinamide, (pza-ciba)			20	20	30				20		70	30

Table 1: market survey of antituberculosis drugs

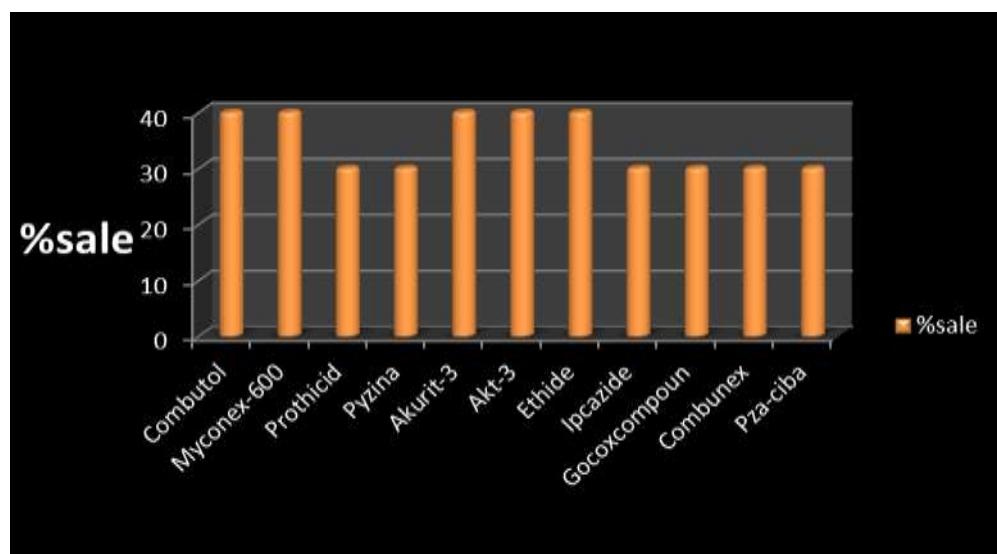


Figure 1: Graphical presentation of antituberculosis drugs and their percentage sale:

DISCUSSION:

The market survey of antituberculosis drugs and their combination shows that there are increased sale of first line of drugs. Doctors prescribed first line of antituberculosis drugs to all patient. Specially the combination of Ethambutol+Rifampicin+isoniazid is mostly prescribed by a Doctor followed by combination of Ethambutol+Rifampicin+Isoniazid+Pyrazinamide. Without combination drugs are prescribed also viz. Ethambutol, Isoniazid, Pyrazinamide. The incidence of pulmonary TB is highly prevalent than extra-pulmonary TB. TB is more prevalent in men than the women. It was also found that the case of drug resistance TB is increasing due to irrespective use of drugs. These type of incidence drew attention of Health Ministry, so, the sale of antituberculosis drugs has banned without a prescription by a registered medical practitioner. However, our study was limited to some hospitals and medical stores of NCR region of India with limited number of patients and was designed for limited duration of time.

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