

**INFECTION DISEASE-TUBERCULOSIS BACTERIA: SINGLE LARGEST KILLER IN INDIA**

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*Received: 14 April 2013, Revised and Accepted: 16 April 2013*

**ABSTRACT**

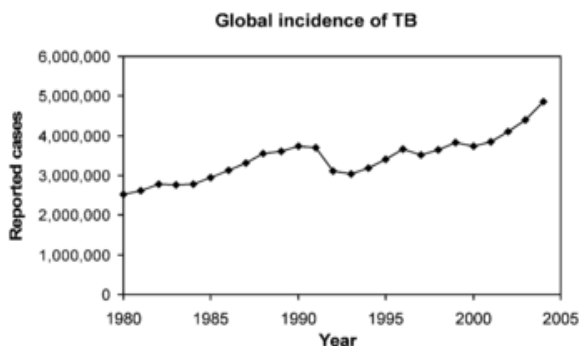
Statistical analysis of tuberculosis with an emphasis to india has been presented in this lpaper. In the absence of administration of poroper drug dose the bacteria may develop resistance to drug. Socio economic harms of TB along with treatment strategy are also given. The pictorial representation are presented as fig 1 to fig 5.A simple mathematical model for this disease in also given.

**Keywords:** Tuberculosis(TB), Bacillus Calmette-Guerin(BCG), Infectious disease

**INTRODUCTION**

Tuberculosis still single largest killer in India. Tuberculosis cases missing detection in India and China are jeopardising global efforts to slash new infections by 2015, says W.H.O. in its 12<sup>th</sup> annual report on global Tuberculosis control released in Geneva. In 2006, the detection rate fell to 3 percent from 6 percent in preceding five years. India has 2.5 million people living with HIV, and Tuberculosis remains the largest single cause of death with 1.7 million new cases annually. Globally There were 9.2 million new cases and 1.7 million death from Tuberculosis in 2006 of these 70,000 case and 2,00,000 deaths were among people infected with HIV, the virus that causes

AIDS.



**Fig.1: Annual number of new reported TB cases, data from WHO.**

The African, Southeast Asian and Western Pacific regions accounted for 83 percent of total cases reported. India, China,Indonesia, South Africa and Nigeria rank as the top five countries in terms of absolute numbers of Tuberculosis cases. Africa has the highest incidence rate per capita, 363 per 1,00,000.

For every five TB cases diagnosed globally in 2006, four went undetected, WHO estimates that only 61 percent of all TB cases

world wide are registered. In 2006, some 9.2 million new cases were detected against 9.1 million in 2005. Including non-detected cases, there were 14.4 million cases of the disease worldwide in 2006, estimates WHO . Symptoms of TB patient has continuous cough for more than three weeks, continuous fever, chest pain, weight loss, loss of appetite, cough with blood. With drug commonly used to treat Tuberculosis failing to cure an estimated 70,000 Indians annually, the country is finally getting serious about combating multi-drug resistant TB (MDR-TB). DOTS plus programme to manage MDR-TB in seven states by early June and in

17 other states of India by May-2009

TB infects 8 lakh people every year in India and when treated in appropriately ( the administration of drug is stopped prematurely or is not done properly), the patient may not only remain sick, but the bacteria that causes the illness may develop resistance to drugs ordinarily used to treat Tuberculosis.

MDR-TB is difficult to treat and causes side effects. The people infected spread it rapidly to others. India’s TB control programme chief Dr. L.S.Chauhan told” labs to diagnose MDR-TB are being accredited in states like Delhi, West Bengal, Kerala, Rajasthan, Tamilnadu, Andhra Pradesh and Haryana and will be functional by end of May’08”. Treating a normal TB patient costs the programme Rs. 500 and takes5-6 months time. Treating a MDR-TB patient will cost Rs. 1.5 lakh over 24-28 months. Ironically, even though India has the world’s highest TB burden, till recently, the country’s national TB control programme had no data on the prevalence of MDR. While 12,500 microscopic centres across India test sputum samples for TB drug resistant. Tuberculosis is being diagnosed in just two labs- in Gujrat and Maharashtra. Only 100 patients have been put on the DOTS plus treatment till now. XDR or extremely drug resistant, for which there is no cure. Plan to roll out the DOTs plus programme in 25 states by the middle of 2009. According to

Dr. L. S. Chauhan 20% of TB patient who are presently being treated, are actually availing re-treatment after having failed to comply with treatment regimens earlier. Over 12% - 17% of these people have become MDR. At present, the success rate of treatment of new cases is 85% and that of re-treatment is 70%. According to WHO's latest surveillance report on drug resistant TB, XDR-TB was found in 45 countries including India. The report said India was struggling with the upgrade, expansion and quality assurance of its laboratory network; it criticized India for lagging behind schedule in scaling up 24 interregional labs capable of testing 5,000 cases per year for MDR-TB.

Dr. Marcos Espinal Executive secretary of the stop TB partnership from Geneva, said that plans to combat drug resistant TB need to be prioritized by the Government, which should increase the number of labs to diagnose MDR and introduce rapid testing methods to quickly identify drug resistant patients.

### SOCIO-ECONOMIC HARMS OF TB

Stress, sleepless nights, smoking and crash diets have pushed up Tuberculosis infection among the urban 18 - 35 year olds, who now account for 60% of TB infections in several upscale hospitals and clinics. The disease shows a clear gender bias, with two in three patients with TB being young women.



**Fig: 2: Mycobacterium Tuberculosis**

About one in three people in India have latent TB, which means they are infected but do not have the symptoms of disease because of strong immunity. In a healthy immune system macrophages type of white blood that ingests foreign material- successfully wall of TB bacteria, but the body cannot mount an effective defense if resistance is low.

Smoking as a TB risk factor has also been emphasized in medical literature in the past five years. Some studies show that it can double the risk."

Unfortunately urban lifestyles make the job easy for the TB bacterium. Crash diets is one of the major factors that can trigger latent TB infection into a full blown disease. Among women, it is a major factor that trigger infection, along with jobs with long and erratic timings, such as those of BPOS (Business Processing and out sourcing). It's a menace that is making women lose their homes and forcing children to drop out of school. Tuberculosis has become one of Indian's worst enemies. Studies conducted on the socio-economic impact of TB have projected that over three lakh children are orphaned by the disease every year while over a lakh women are rejected by their families, once they contact this disease.



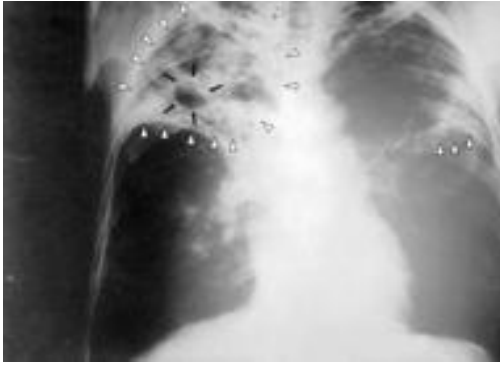
**Fig 3: Tuberculosis is spread by aerosols created by coughing or sneezing**

Fear of becoming homeless and social isolation leads over 75% of women, diagnosed by TB, to dismiss their constants coughing as seasonal. Thousands of children, on the other hand, drop out of school on account of parental illness, while over 20% of them take up jobs in order to supplement income, especially if the father has TB, there by adding to the already unwieldy figures of child laborers, several studies conducted between 1997 - 2006 by Rajeshwari Ramachandran from Tuberculosis Research Centre, Chennai, confirmed that TB had tremendous impact on patients, household in term of income, health, education and nutrition particularly if the patient was a wage earner

### PROMISING PROSPECTS

#### Efforts for the treatment of TB by NTP (National Tuberculosis Programme)

NTP was started through the country in the year 1962. According to this programme, the diagnosis of TB patient is conducted on the basis of X-ray. The importance is not attached to the examination of sputum. This treats only the patients of TB related to lungs. Patients were given medicines for one month without monitoring the treatment.



**Fig 4: X-ray of a patient suffering from Tuberculosis**

The course for treatment was for one year, in which the drugs Isonex, Ethambutol, Streptomycin were used. Patients were required to take medicine daily. In this programme, the cure rate was 30%. For all these reasons, the new programme called RNTCP (Revised National Tuberculosis Control Programme) introduced.

**New TB Control Strategy by RNTCP ( Revised National Tuberculosis Control Programme ), DOTs ( Directly Observe Treatment Strategy)**



**Fig 5: Mycobacterium Tuberculosis in Sputum**

RNTCP starting with a few cities gradually in 1992, this programme has been introduced through out the country till 2005. In this programme, the emphasis has been laid on examination of sputum along with X-ray for diagnosis of TB. In this system a part from the treatment of lungs TB, all other forms of TB have also been covered under it. Under this scheme, monitoring of the treatment is done and medicines are also provided. Normally course of the treatment continuous from six to eight months that is why it is called short course also. Apart from three drugs Isonex, Ethambutol, Streptomycin two more drugs Rifampicin, Pyrazinamide are also used in it. Patient takes drugs for three days a week. Death rate has been reduced with the introduction of RNTCP. Previously there was one death in one minute. Now there are two deaths in three minutes. In this field, we are getting success. In this scheme the greater emphasis is being laid on supervision and monitoring.

One district is divided into sub-district and in charge of sub-district is called MOTC (Medical Officer Tuberculosis). This is done for better monitoring and supervision. One sub-district is formed with the population of 5 lakhs. The responsibility for that is given to MOTC. That is why we are getting constant success from RNTCP.

**Formation of mathematical models of Tuberculosis Blower [4] presented a simple deterministic model in the form**

$$ds/dt = \lambda - \beta IS - \mu S$$

$$dI/dt = (1-p) \beta IS - (\gamma + \mu) I$$

$$\text{and } dL/dt = p\beta IS + \gamma I - (\mu + \mu_T) L$$

Where S, L and I are susceptible, latent and infected class of individuals, The other symbols stand for

$\beta$  = transmission coefficient

$\mu$  = natural death rate

$\mu_T$  = death rate due to disease

$\gamma$  = progression rate from latency of active disease, and

$p$  = proportion of the population which is infected.

Another analogous model is given by Feng et al. [8], the transmission dynamics are also available in literature [2,3,7]. The modification or extensions of these models are rapidly progressing.

#### PREVENTIVE MEASURES

To prevent ourselves from cough of the patient. The patient must cover his/her mouth with a cloth. There should be healthy nutrition for the patient. There should be proper treatment of the infected patient. Children are vaccinated to protect them from TB. Unfortunately no vaccine is available that provides reliable protection for adults.

#### CONCLUSION

We conclude that from basic research any one can stop TB by creating awareness that cough for more than 3 weeks can be TB, supporting TB patients to take complete treatment of 6 to 8 months which is absolutely free, guiding patients to the nearest health centre for sputum examination and becoming DOT provider.

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