

Incidence of Tuberculosis in Diabetic Patients

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Authors' contributions

This work was carried out in collaboration between all authors. Author YM designed the study. Authors HY and HR performed the statistical analysis. Authors SSUH, MS and MAB wrote the protocol. Author SAR wrote the first draft of the manuscript and managed the literature searches. Authors QW and ZMUDK collected the data for the study and literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Tuberculosis is an infectious disease, which is caused by bacteria (*Mycobacterium tuberculosis*). The disease is mostly transmitted from person to person, usually by inhaling bacteria (*Mycobacterium tuberculosis*) carrying air droplets. Tuberculosis most commonly affects the lungs, but it can also affect any other organ. The infection doesn't always result in disease. The human immune cells can check and control pathogens, so that progression to disease only occurs in about 10% of adults. However the bacterial infection may remain latent and can reactive at any time, also after decades if e.g. the immune system is weakened. If left untreated, tuberculosis is a life-threatening illness. Main objective of this study is to highlight incidence and severity of the diabetic patients which can suffer from TB. The most commonly used diagnostic tool for tuberculosis is a simple skin test or smear microscopy,

though blood tests are becoming more commonplace. A small amount of a substance called PPD tuberculin (tuberculin purified protein derivative) is injected just below the skin of your inside forearm. You should feel only a slight needle prick. Another test for tuberculosis (TB) blood test, also called an Interferon Gamma Release Assay could be performed.

Keywords: Tuberculosis; droplets; adults; diabetic.

1. INTRODUCTION

Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis* (Mycobacteriaceae). The bacteria usually attack the lungs, but they can also damage other parts of the body [1].

Mycobacterium tuberculosis spreads through the air when a person with TB of the lungs or throat coughs, sneezes, or talks [2].

If a germ infection does become active, it most commonly involves the lungs (in about 90% of cases) Symptoms may include chest pain and a prolonged cough producing sputum. About 25% of people may not have any symptoms (i.e. they remain "asymptomatic"). Occasionally, people may cough up blood in small amounts, and in very rare cases, the infection may erode into the pulmonary artery or a Rasmussen's aneurysm, resulting in massive bleeding [3]. Tuberculosis may become a chronic illness and cause extensive scarring in the upper lobes of the lungs. The upper lung lobes are more frequently affected by tuberculosis than the lower ones. The reason for this difference is not clear. It may be due to either better air flow, or poor lymph drainage within the upper lungs [4].

2. EXTRA-PULMONARY TUBERCULOSIS

In 15–20% of active cases, the infection spreads outside the lungs, causing other kinds of TB. These are collectively denoted as "extra-pulmonary tuberculosis". Extra-pulmonary TB occurs more commonly in immuno-suppressed persons and young children. In those with HIV, this occurs in more than 50% of cases [5]. Notable extra-pulmonary infection sites include the pleura (in Tuberculous pleurisy), the central nervous system (in tuberculous meningitis), the lymphatic system (in scrofula of the neck), the genitourinary system (in urogenital tuberculosis), and the bones and joints (in Pott disease of the spine), among others. When it spreads to the bones, it is also known as "osseous tuberculosis", a form of osteomyelitis [6].

Sometimes, bursting of a tubercular abscess through skin results in tuberculous ulcer. An ulcer originating from nearby infected lymph node is painless, slowly enlarging and has an appearance of "wash leather". A potentially more serious, widespread form of TB is called "disseminated tuberculosis", also known as miliary tuberculosis. Miliary TB makes up about 10% of extrapulmonary cases [7].

3. DRUG-RESISTANT TUBERCULOSIS

Another reason tuberculosis remains a major killer is the increase in drug-resistant strains of the bacterium. Since the first antibiotics were used to fight tuberculosis more than 60 years ago, some TB germs have developed the ability to survive, and that ability gets passed on to their descendants [8].

Drug-resistant strains of tuberculosis emerge when an antibiotic fails to kill all of the bacteria it targets. The surviving bacteria become resistant to that particular drug and frequently other antibiotics as well. Some *Mycobacterium tuberculosis* have developed resistance to the most commonly used treatments, such as isoniazid and rifampin [9].

Some strains of TB have also developed resistance to drugs less commonly used in TB treatment, such as the antibiotics known as fluoroquinolones, and injectable medications including amikacin, kanamycin and capreomycin. These medications are often used to treat infections that are resistant to the more commonly used drugs [10].

Diabetes occurs when your blood glucose level is too high. Blood glucose is the main type of sugar found in your blood and that is main source of energy. Glucose comes from the food you eat and is made in your liver and muscles. Your blood carries glucose to all of your body's cells to use for energy.

Your pancreas—an organ, located between your stomach and spine, that helps with digestion—

releases a hormone it makes, called insulin, into your blood. Insulin helps your blood carry glucose to all your body's cells. Sometimes pancreas doesn't make enough insulin or the insulin doesn't work the way it should. Glucose then stays in your blood and doesn't reach your cells. Your blood glucose levels get too high and can cause diabetes or prediabetes.

Table and number of patients are selected and check according to them.

We obtain all data from "Dot Unit" of "Gulab Devi Chest Hospital" and general observations from different hospitals and clinic in Punjab.

Our study duration is about 6 months.

4. METHODOLOGY AND RESULTS

4.1 Data Analysis

We included diabetic and no diabetic patients according to age groups and according to sex.

We have used excel for data analysis and plot different graphs.

Table 1. All cases registered during quarter (except for TB cases moved to the second line treatment register)

| TB patient type | Number of cases | Treatment out comes | | | | | Total |
|---|-----------------|---------------------|----------------|-----------|-------------------|---------------|-------------|
| | | Smear negative | Smear positive | Died | Loss of follow up | Not evaluated | |
| Bacteriologically confirmed and new replase | 953 | 748 | 69 | 39 | 40 | 57 | 953 |
| Clinically diagnosed new and replase | 482 | 400 | 3 | 24 | 46 | 9 | 482 |
| Extra pulmonary bacteriologically confirmed/or clinically diagnosed | 241 | 207 | 0 | 3 | 28 | 3 | 241 |
| Retreatment (excluding replase) | 107 | 80 | 2 | 6 | 6 | 13 | 107 |
| Total | 1783 | 1435 | 74 | 72 | 120 | 82 | 1783 |

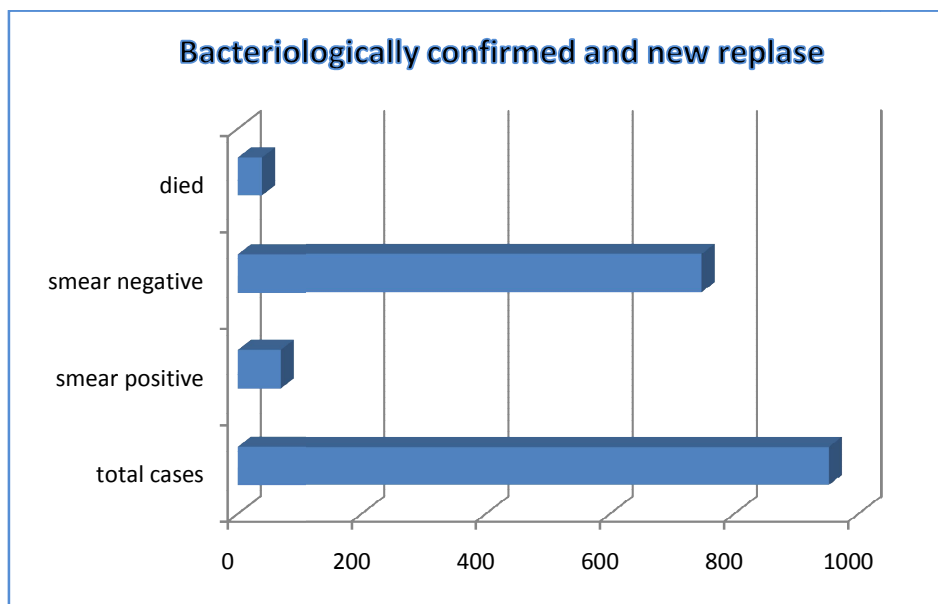


Fig. 1. Graph of bacteriologically confirmed and new replase

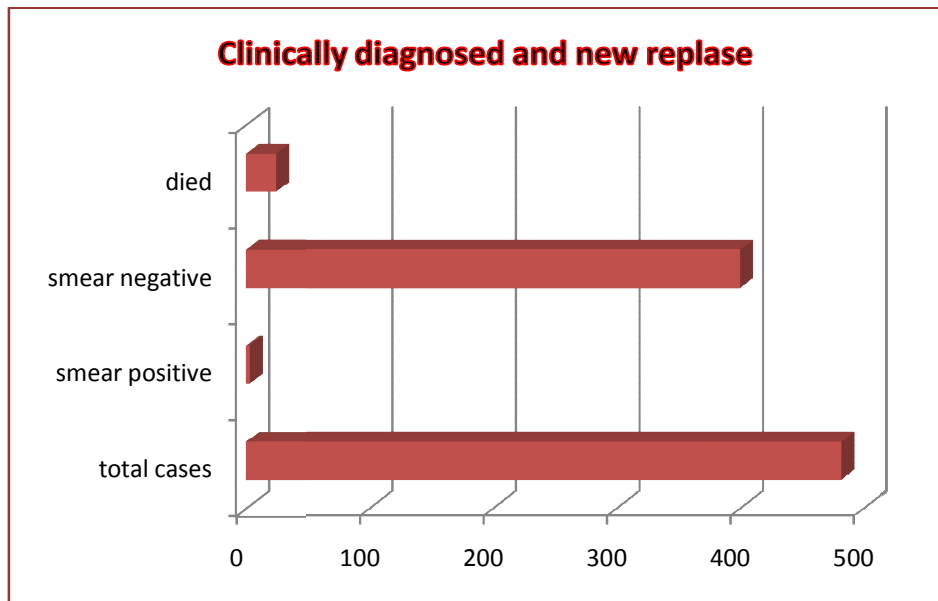


Fig. 2. Graph of clinically diagnosed and replace

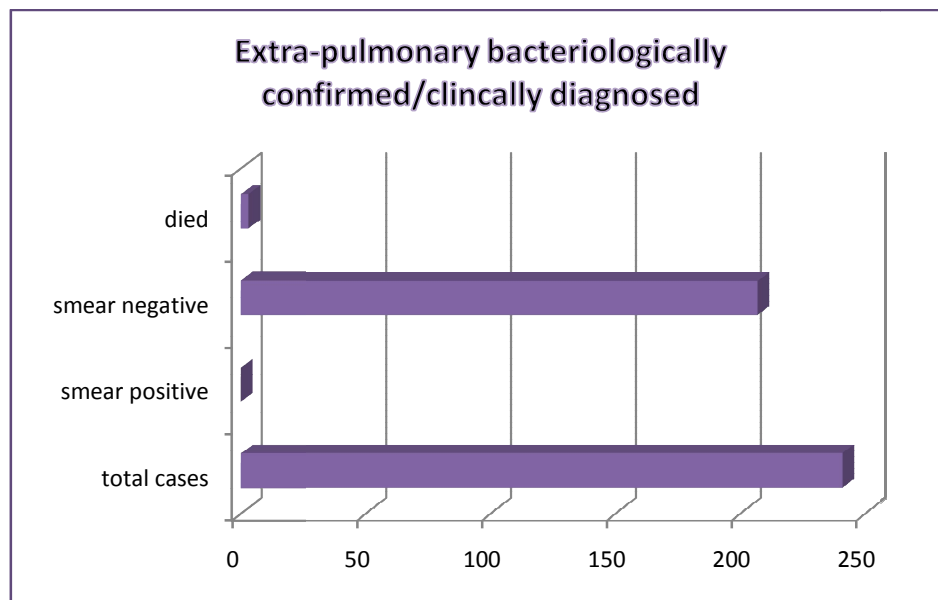


Fig. 3. Graph of extra-pulmonary bacteriologically confirmed/ clinically diagnosed

Table 2. According to sex, number of diabetic and non-diabetic patients, with or without

| Sex | No. of diabetic patients with tuberculosis | No. of Non-diabetic patients with tuberculosis |
|--------|--|--|
| Male | 15 | 20 |
| Female | 22 | 17 |

Table 3. According to age group, percentages of patients with tuberculosis, diabetes and both

| Age groups | % age of patients with tuberculosis | % age of patients with diabetes | % age of patients with tuberculosis and diabetes; both |
|--------------|-------------------------------------|---------------------------------|--|
| 0-17 | 2 | 4 | 0 |
| 18-30 | 42 | 10 | 2 |
| 31-60 | 26 | 35 | 18 |
| 61 and older | 13 | 52 | 25 |

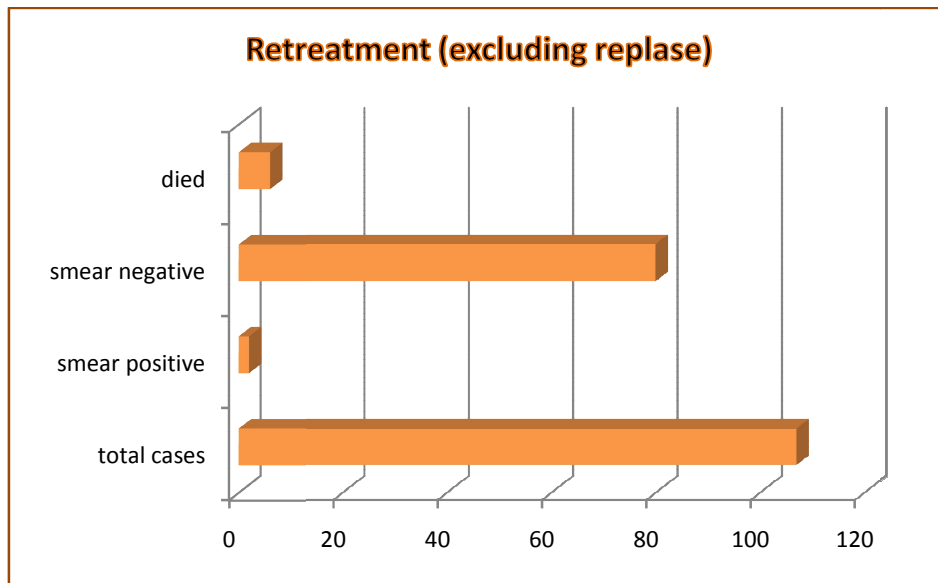


Fig. 4. Graph of retreatment (excluding replase)

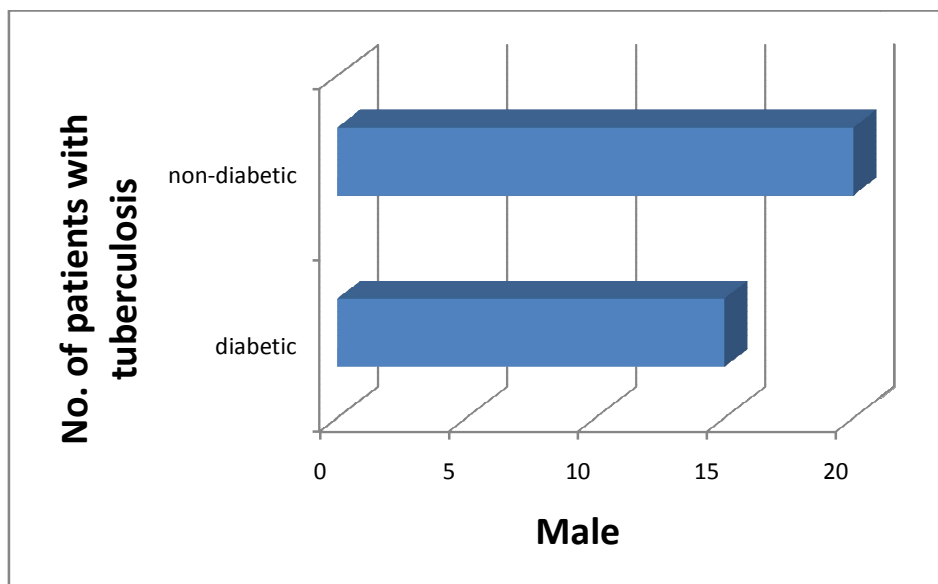


Fig. 5. Graph of no. of diabetic and non-diabetic patients with tuberculosis versus male

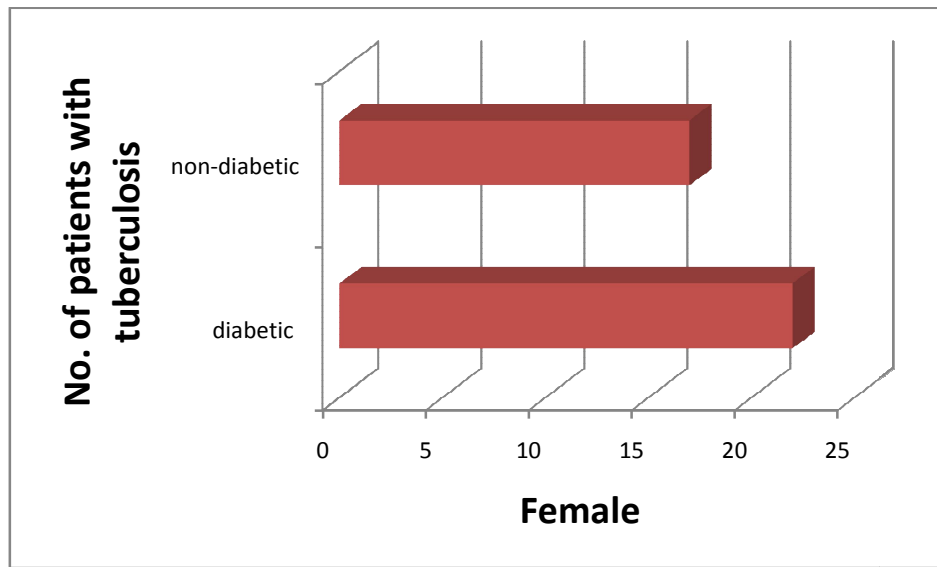


Fig. 6. Graph of no. of diabetic and non-diabetic patients with tuberculosis versus female

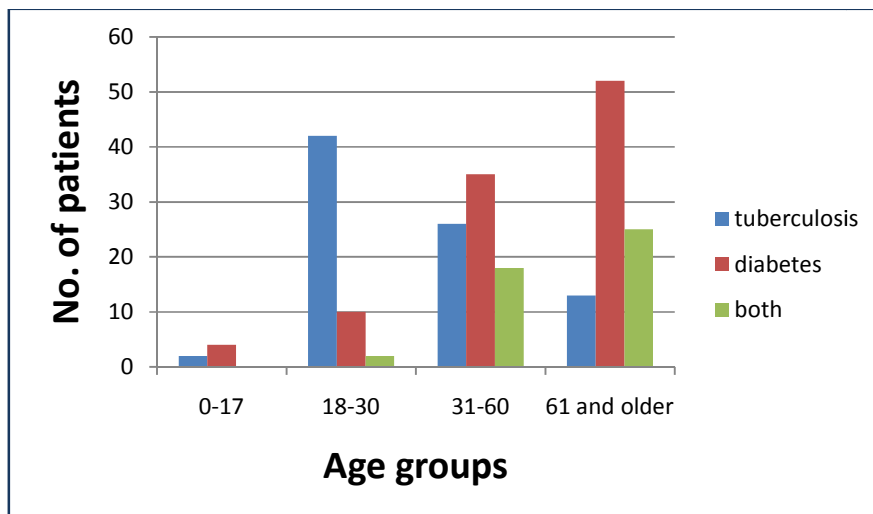


Fig. 7. Graph of no. patients with age group

5. CONCLUSION

The death rate of tuberculosis in 2015 was 259 whereas in the 6th month of 2016 it was 148, which means besides of advancement still the death rate is not controlled and increasing.

The patients with diabetic disease are more in female as compare to male but the patients with non-diabetic disease are more in male than female.

According to age group; the 18-30 years patients have more chances of tuberculosis; while the 61

years and older are more chances for diabetes because their immune system is too weak.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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