

# *Epidemiological Status and Prevention and Control of Diabetes Mellitus Complicated With Tuberculosis and Other Infectious Diseases*

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**Keywords:** Diabetes and Tuberculosis, Infectious Disease Research, Disease Prevention and Control, Popular Status

**Abstract:** Diabetes mellitus and tuberculosis have been paid more and more attention. They can exist and influence each other. Diabetes mellitus is known by many doctors as a separate risk factor for tuberculosis. Tuberculosis can cause disorders in the external environment of diabetic patients and easily cause many acute and chronic complications in patients with high sugar concentration. The combination of the two has long been a very difficult problem in medicine. In this paper, the relationship between the probability of diabetic patients' second admission to hospital and the related characteristics is studied. The results of the model analysis showed that 135 patients were divided into observation group and control group with 64 cases in each group by randomly selected detection method. Two groups of patients were given clinical routine drug treatment, while the control group was given routine nursing during the treatment. Nursing compliance and satisfaction with nursing were very high, and the treatment effect was good for diabetic patients. The treatment model is helpful for the rational treatment of diabetic patients, further understanding of the relationship between diabetes and tuberculosis and the relationship between them, so that the disease in the treatment can achieve better results and prevention treatment.

## **1.Introduction**

Diabetes is a lifelong disease. Once you have diabetes, you need to take your medicine for life. But doctors pointed out that in addition to congenital factors, diabetes production and eating habits can't be separated [1]. Therefore, while diabetes is being treated, healthy eating is also critical. What are the dietary precautions for diabetic patients? We must first learn about diabetes. Diabetes is a

group of metabolic diseases characterized by chronic hyperglycemia caused by a combination of genetic and environmental factors. Metabolic disorders such as carbohydrates, proteins, fats, water and electrolytes are caused by defects in insulin secretion or action. The clinical manifestations of diabetes are often described as "three more and one less" polyuria, polyphagia and weight loss [2]. As the disease progresses, the heart, brain, kidney, and retina are affected. According to the actual situation, it is necessary to pay attention to the analysis of poisoning. Patients may have hyperglycemia and hyperosmotic conditions, which may cause metabolic disorders. In the whole treatment, it is necessary to understand the precautions of clinical diet care, and orderly judgments as China's urbanization process accelerates, lifestyle and population ageing, diabetes The number of cases is constantly increasing, and there are many cases of cardiovascular and cerebrovascular diseases, which directly affect people's health. In China, the emphasis on clinical disease treatment, especially in the treatment of diabetes, is of high concern. China has become the country with the largest number of urinary patients in the world. What is more serious is that about 60% of diabetic patients in China are not diagnosed, and the control of diabetes in those who have received treatment is also unsatisfactory. Reducing the incidence of diabetes and making diabetes control more ideal, the diet health of diabetes is particularly important [3].

Tuberculosis is a chronic consumptive, infectious disease that seriously harms human health. Tuberculosis is very serious worldwide and is one of the most serious public health problems in the world and must be widely recognized around the world. Tracing back to history, tuberculosis can be said to be one of the most widely distributed and oldest diseases worldwide [4]. Tuberculosis was once widespread in the world, causing harm to the health of all human beings, and once the medical community was frustrated and helpless. Since ancient times, hundreds of millions of people have died from tuberculosis [5]. It has been reported that after about 500 million years ago, mycobacteria continued to evolve and mutate, and modern *M. tuberculosis* complexes appeared about 15,000-35,000 years ago. Mycobacterium tuberculosis was discovered in the 18th century, and experimentally confirmed that the pathogen of tuberculosis came from *Mycobacterium tuberculosis*. Because there was no medical treatment of tuberculosis at the time, the tuberculosis was ravaged around the world. In the last century, a vaccine against tuberculosis, a live attenuated tuberculosis vaccine (Bacillus Calmette-Guerin), was invented. Since then, the live attenuated tuberculosis vaccine has been applied worldwide, and the use of this vaccine can prevent tuberculosis. Anti-tuberculosis drugs have been *introduced* since the 1940s, which has caused a major turning point in the treatment of tuberculosis. With the emergence and use of anti-tuberculosis drugs such as isoniazid and rifampic, patients with tuberculosis have received timely and effective treatment, which has significantly reduced the spread of tuberculosis, and the treatment of global tuberculosis has entered a new era [6].

Qin explored the impact of health literacy on diabetes prevention and control and the risk factors for low diabetes health literacy in elderly patients with diabetes in rural China. A cross-sectional survey was conducted on the elderly in rural communities in Yiyang, China. Through a multi-stage cluster random sampling, 42 regions and 434 pre-diabetes patients were selected, and these patients were interviewed using the China Diabetes Health Literacy Survey [7]. They found that in rural China, the level of health knowledge about diabetes prevention and control among elderly diabetic patients is low. Appropriate health education for low-educational older people should be included in the prevention of diabetes. Some teams conducted an online survey of key representatives of all local health departments in Missouri. Descriptive statistics are used to describe the implementation and feasibility of 20 diabetes prevention and control EBPPs. A regression was used to examine the association between personal and organizational factors and diabetes prevention and control EBPP implementation [8]. One hundred local health authorities participated in the online survey (recovery rate was 89%). The most commonly implemented diabetes-related EBPPs in the local health sector

include nutrition education for institutions or community members, increased access to fruits and vegetables in the community environment, and physical exercise campaigns within the community. Encourage others in the department to use evidence-based decision making and institutional incentives to help employees use evidence-based decision making to positively correlate with diabetes prevention and control EBPP implementation. The local health sector is at the “first line” of public health, and this study demonstrates the important role of these organizations in the implementation of diabetes prevention and control of EBPPs [9]. The team evaluated these issues based on tuberculosis epidemiology, care and prevention. In order to carry out the assessment, they borrowed extensively on the literature on cash transfers and drew on the lessons learned so far from other health outcomes (tuberculosis). The implementation of cash transfer interventions in the context of tuberculosis continues to be hampered by important knowledge gaps. The initial direction can be affirmed from the literature on cash transfer programs and other public health challenges (tuberculosis). However, a solid research agenda is being developed to address the unknown impact of cash transfer on tuberculosis epidemiology and control [10].

In this paper, the relationship between the re-admission rate of diabetic patients and its related feature vector was studied. The evaluation index system was obtained by ridge regression and linear fitting. The relationship model between re-admission rate and its corresponding characteristic variables was obtained by stepwise regression. The analysis of the model results showed that 120 patients were equally divided into observation group and control group by computer random selection method. The two groups were given routine clinical medication. The control group received routine nursing during treatment and the observation group was humanized. Nursing, and the effect of the two groups of nursing treatment were compared. Compared with the control data, the total effective rate of nursing treatment, nursing compliance and satisfaction with nursing were higher in the observation group. The treatment effect on diabetic patients is better; middle and low income recipients may consider insulin and metformin to control diabetes; high level income may consider tolazamide to control diabetes. The treatment model of this problem contributes to the rational treatment of diabetic patients, and further understands the relationship between diabetes and tuberculosis and the two, in order to achieve better curative effect in treatment and improve the cure rate of diabetes patients with pulmonary tuberculosis.

## 2. Diabetes and Tuberculosis

### 2.1. Diabetes

#### (1) Causes of diabetes

Diabetes is caused by a combination of genetic and environmental factors. Another reason is that Chinese people have the ability to save genes. The so-called "saving genes" refers to genes that can make the body's metabolic mechanism in a state of conservation. Even if you eat pharyngeal vegetables, the body will absorb nutrients to the maximum extent. This is for many years. People adapt to the consequences of harsh environments. Therefore, when life is "invaded by luxury," people who save genes are more likely to become obese and have diabetes

#### (2) Type of diabetes

Diabetes can generally be divided into four categories: first, insulin-dependent (type 1); second, non-insulin-dependent (type 2); third, specific or other types (type 3); fourth, gestational diabetes (Type 4). Among them, the causes of insulin-dependent and non-insulin-dependent types are still unclear, and they are usually referred to as primary diabetes. Under normal circumstances, insulin-dependent diabetes is mainly caused before the age of 30, but some patients are in the adult and old age, the condition is critical, it is easy to produce ketoacidosis, and even coma. Some patients may have different degrees of cellular function after the corresponding insulin treatment,

and even patients may stop using insulin after a period of treatment. Type 2 diabetes is common in adults or the elderly, with milder onset and slow onset. Most patients are mainly obese. Plasma insulin levels can be high, normal or low, and the incidence of type 2 diabetes. Higher, accounting for more than 90% of the total number of diabetes. Gestational diabetes, also known as type 4 diabetes, occurs mostly during pregnancy. In addition to gestational diabetes, insulin-dependent diabetes mellitus, and non-insulin-dependent diabetes mellitus, other types of diabetes can be referred to as specific or other types of diabetes, or type 3 diabetes.

### (3) Complications of diabetes

1) Diabetic Cardiovascular Diseases Most people with diabetes have high blood lipids, and high blood pressure is very likely to suffer from cardiovascular and cerebrovascular diseases.

2) Diabetic nephropathy Diabetic nephropathy is a very serious condition for diabetic patients and has a greater harm to patients.

3) Diabetic eye disease Diabetic patients with ocular complications are generally seen in seven types: diabetic retinopathy; diabetic pigmented membrane disease; diabetic cataract; diabetic optic nerve changes; diabetic retinopathy; diabetic glaucoma Diabetic.

4) Diabetic neuropathy Diabetic patients have multiple lesions in the nervous system, which are collectively referred to as diabetic neuropathy.

## 2.2. Tuberculosis

### (1) Causes of Tuberculosis

Tuberculosis is a systemic chronic infectious disease caused by infection with *M. tuberculosis*. When the human body is infected with *M. tuberculosis*, it does not necessarily form 100% tuberculosis. The incidence of tuberculosis is about 10%. The main reason is related to the immunity of the human body. When the body's resistance is strong, it is only hidden. Sexual infection, no tuberculosis. When *M. tuberculosis* invades the human body, the human body will produce an allergic reaction, which is a cellular immune response in which regulatory T lymphocytes play an important role. In the case where T lymphocytes are extensively destroyed and reduced, the body is against *M. tuberculosis*. The susceptibility to infection increases. Diabetes patients will increase the apoptosis of T lymphocytes due to the disorder of their own metabolic factors, causing abnormalities in specific immune functions, making the body susceptible to *M. tuberculosis*. Diabetic patients may stimulate the Fas/FasL (suicide-related factor/suicide-related factor ligand) signaling system due to the production of various metabolic factors, and the expression of FasL is increased, and the apoptosis of Fas(+) T lymphocytes is increased. The apoptosis of infected macrophages is reduced, and intracellular *M. tuberculosis* can escape the killing effect of T lymphocytes, and immune escape occurs, so that *M. tuberculosis* in macrophages can survive for a long time, and *M. tuberculosis* is long in the body.

### (2) Classification of Tuberculosis

1) Primary tuberculosis refers to tuberculosis that is the first infection, including the primary syndrome and intrathoracic lymph node tuberculosis. More common in children, chest imaging is mainly manifested in the primary lesions in the lungs and intrathoracic lymphadenopathy, or simple intrathoracic lymphadenopathy.

2) Hematogenous disseminated pulmonary tuberculosis includes acute, subacute and chronic hematogenous disseminated tuberculosis. Acute hematogenous disseminated pulmonary tuberculosis is characterized by uniform miliary-like nodules of uniform density and density in both lungs; diffuse nodules of subacute or chronic hematogenous disseminated pulmonary tuberculosis, mostly distributed in the middle and upper parts of the two lungs, varying in size and density Etc., there can be integration. Children with acute hematogenous disseminated pulmonary tuberculosis

sometimes only appear as ground-glass shadows, and the infants have obvious exudation around the miliary lesions, with blurred edges and easy integration.

3) Secondary tuberculosis is the most common type of tuberculosis in adults, and chest images are diverse. The light manifestations are mainly patches, nodules and strips, or tuberculoma or isolated cavities; severe cases can be characterized by lobar infiltration, caseous pneumonia, multiple cavity formation and bronchial dissemination; Pulmonary damage can occur, and the volume of damaged lung tissue is reduced. There are multiple fibrous thick-walled cavities, secondary bronchiectasis, or multiple calcifications. The adjacent hilar and mediastinal structures are pulled and displaced, the thoracic collapse, and the pleural thickening. Adhesion, other lung tissue, modern compensatory emphysema and new and old bronchial disseminated lesions.

4) Tracheobronchial tuberculosis refers to tuberculosis that occurs in the mucosa, submucosa, smooth muscle, cartilage and adventitia of the trachea and bronchi, and is a special clinical type of tuberculosis. Mainly manifested as irregular thickening of the trachea or bronchial wall, stenosis or obstruction of the lumen, lung tissue at the distal end of the bronchus may have atelectasis or lung consolidation, bronchiectasis and other parts of the bronchial disseminated lesions.

5) Tuberculous pleurisy is divided into dry pleurisy and exudative pleurisy. Dry pleurisy is an early inflammatory reaction of tuberculous pleurisy, usually no obvious abnormal imaging; exudative pleurisy mainly manifests as pleural effusion, pleural effusion can be a small amount or medium-large amount of free effusion, or can be chest The localized effusion in any part, the slow absorption often combined with pleural thickening adhesion, can also evolve into pleural tuberculoma and empyema.

### 2.3. The Link between Diabetes and Tuberculosis

#### (1) Common Strains and Pathogenesis

A kind of tuberculosis bacteria once infected cattle in America and Europe, and spread to everyone through milk. At that time, the consumption of milk was strictly controlled. Basically, the transmission route of bovine tuberculosis had been cut off, and the extensive use of pasteurization of milk was strictly controlled. The shape of *Mycobacterium tuberculosis* is slender and slightly curved, 1-4 $\mu$ m long and 0.3-0.6 $\mu$ m wide. *Mycobacterium tuberculosis* is usually single branched or scattered, without buds or flagella. TB can survive for a long time. It has strong resistance to acids and bases; however, it has weak resistance to UV, humidity and high temperature, and ethanol. It can be killed within half an hour after irradiating the 10W ultraviolet lamp with a distance of 0.5-1m, and within 3-4 hours after irradiating the sunlight. When the human body is infected with *Mycobacterium tuberculosis*, not 100% of them form tuberculosis, and the incidence of tuberculosis is about 10%. The main reason is related to the human body's immunity. At this time, the human body has strong resistance, only the recessive infection, not tuberculosis. When *Mycobacterium tuberculosis* invades the body, the human body will produce allergic reaction. It is a kind of cellular immune reaction, which plays an important role in regulating T lymphocytes. Pulmonary tuberculosis is an infectious disease caused by the lung, which will have a great impact on the bronchi of patients. After serious destruction of bronchus and lung tissue, it will make the patient's pulmonary artery appear high pressure symptoms, the right ventricle of the heart become hypertrophic, and eventually lead to cor pulmonale and cardiopulmonary failure. This complication is one of the important causes of death in patients with pulmonary tuberculosis. When T lymphocytes are destroyed in large quantities and the situation is alleviated, the susceptibility of human body to opposite / moderate tuberculosis infection increases. Due to the disorder of self metabolism factors, diabetic patients will increase the apoptosis of T lymphocytes, which will lead to abnormal specific immune function and make the human body susceptible to infection with

Mycobacterium tuberculosis. Mycobacterium tuberculosis can escape the function of T-lymphocyte and immune escape, which can make Mycobacterium tuberculosis survive in macrophage for a long time. Mycobacterium tuberculosis can survive in vivo for a long time and cause diseases, resulting in the disorder of blood glucose regulation in diabetic patients. When the sugar content in human tissues and blood increases, the human body will present an acidic environment, which will reduce the formation of antibodies and tissue resistance, thus weakening the immune function, and provide favorable conditions for reproduction and growth of Mycobacterium tuberculosis. The disorder of fat metabolism in diabetic patients makes a lot of fat decompose into triacylglycerol and enter the blood, which is beneficial to the reproduction of tuberculosis. In addition, diabetic patients will cause protein metabolism disorder, resulting in protein production reduction, low protein content or malnutrition, which will lead to the decline of immunity. In patients with diabetes mellitus, a long-term rise in blood glucose can make the body produce a variety of protein non enzymatic glycosylation reactions and form advanced glycation end products, which are not conducive to clearance in the case of long-term hyperglycemia. It will produce many changes in the body, such as the destruction of cellular immune function, resulting in the difficulty of clearance of N / med tuberculosis bacteria in the body. Insulin secretion and insulin antibody in the blood of diabetic patients will cause the metabolism disorder of human body fat, carbohydrate and protein, increase the content of free fatty acid and sugar, increase the blood viscosity and microcirculation disorder, and make the human body produce a series of metabolic changes, which lead to the growth of N / med tuberculosis in the body and become the three basic metabolic disorders of diabetes. It destroys the integrity of respiratory mucosal epithelium, causes the significant reduction of respiratory immune function, interferes with the synthesis of albumin, and results in the decrease of antibody ability and resistance in human body.

#### (2) susceptible population and clinical manifestations

Pulmonary tuberculosis patients with type 2 diabetes, female patients are generally less than male patients, age can be 20-89 years old, more common in middle-aged and elderly patients over 40 years old, clinical performance: most patients lack more than three typical symptoms of diabetes, Often due to complications or unexplained weight loss, or due to physical examination; some patients with tuberculosis often do not have typical cough, cough, chest pain, hemoptysis, night sweats, fatigue, weight loss, fever and other related performance, due to physical examination and found the condition; Some patients will see a doctor because of sudden hemoptysis, usually hemoptysis is more serious; some patients will find the disease due to persistent weight loss for unknown reasons.

### 3. Experiments

#### 3.1. Experimental Object

This article selects 3,755 patients with tuberculosis diagnosed in hospital from March 1, 2019 to August 31, 2019. There are 2,297 males and 1,458 females. The age range is 15-90 years old and the average age is (48.0±16.7) years old.

#### 3.2. Experimental Settings

(1) Make a careful record of patients with a history of diabetes mellitus (no fasting blood glucose screening and glucose tolerance test). For those who have no history of diabetes, fasting blood glucose tests are performed before administration. For patients with 6 mmol/L <fasting blood glucose <7.0 mmol/L, a glucose tolerance test was further performed to determine whether or not to diagnose diabetes.

(2) Venous blood is collected, and blood sugar is detected by a biochemical analyzer. The sputum smear was examined for 3 times, including instant sputum, night sputum and morning sputum.

(3) Statistical methods: Statistical analysis was performed using SPSS19.0 software system. The difference in smear-positive rate and the difference between primary and recurrent pulmonary tuberculosis and diabetes were compared by X2 test. The difference was statistically significant at  $P < 0.05$ .

Detection method:

(1) Detection method of sputum smear acid-fast bacilli: The patients were collected at night, in the morning, and immediately sputum for 3 times, and the smear was stained with acid resistance (microscopic observation showed that if more than 3 out of every 100 fields of view were diagnosed as positive).

(2) Test method for sputum tuberculosis culture: It is the most reliable method, and is known as the "gold standard". The modified Roche method is applied. The culture time is generally 2-8 weeks, and 10-100 bacteria per ml can be cultured positive.

(3) GeneXpertMTB examination: It is a fully automated molecular diagnostic method based on the amplification of Mycobacterium tuberculosis by a US company. It detects the presence of Mycobacterium tuberculosis directly from the sputum within 2 hours.

(4) Detection method of tuberculosis antibody: The detection of tuberculosis antibody was carried out by using gold-labeled spot immunofiltration.

(5) PPD (tuberculin) test, inject 0.1 mL of tuberculin into the skin of the patient, select the data of the forearm palmar side of the injection department, and observe the skin induration at the injection site for 48-72 hours, and record the induration average. diameter. (The diagnostic criteria are as follows: negative for induration diameter  $< 5\text{mm}$ , weak positive for induration diameter 5-9mm, general positive for induration diameter 10~19mm, strong positive for induration diameter  $\geq 20\text{mm}$  or localized lymphangitis, ulceration, necrosis and blisters ).

(6) Imaging examination: All patients underwent CT examination of the lungs. Two imaging specialists read the films separately to record the nature, location and morphology of the lesions.

### 3.3. Test Data Acquisition

(1) Blood glucose *screening* and sputum smears in patients with pulmonary tuberculosis: see Table 1 for details. A total of 540 people with a history of diabetes have been identified in patients with tuberculosis. There was no history of diabetes, and there were 3129 people who underwent fasting blood glucose screening, including 97 newly diagnosed diabetes patients, 277 impaired glucose tolerance (IGT) and/or impaired fasting glucose regulation (IFG). A total of 450 sputum smear positive, a total of 3233 sputum smear negative.

Table 1. Tuberculosis blood glucose screening

Sputum Smear Result	Registration	Number of diabetes mellitus in the past	Number of people screened for blood sugar	New diagnosis of diabetes mellitus	Total known number of diabetes mellitus+New
Positive	450	155	372	28	184
Negative	3233	385	854	69	468
Total	3683	540	3129	97	652

(2) Pulmonary tuberculosis combined with undiabetes and sputum smear to check tuberculosis yang, negative relationship analysis. See Table 2 for details. There were 792 people with pulmonary

tuberculosis and diabetes, accounting for 18.49% of all tuberculosis patients, including 118 people with sputum sputum, 22.3% smear-positive rate, higher than tuberculosis without diabetes. The rate of sputum sputum was 12.3%,  $\chi^2=61.86$ ,  $P < 0.08$ , the difference was statistically significant.

*Table 2. Merged or not merged Diabetes and Sputum smear results*

Classification of patients	Rata(%)	Positive number	Smear positive rate(%)	Negative number	Smear negative rate (%)
Pulmonary tuberculosis with diabetes mellitus	18.49	118	22.3	397	55.6
Pulmonary tuberculosis Diabetes mellitus	69.53	338	9.6	3607	68.7
Total	88.02	456	12.7	3004	74.3

(3)The statistics of abnormal blood glucose in patients with pulmonary tuberculosis are shown in Table 3. This study showed that patients with tuberculosis with diabetes, initial treatment of 14.6%, retreatment reached 22.3%, retreatment compared with the initial treatment combined rate ( $P < 0.04$ ), the difference was statistically significant; combined with IGT and / or IFG, Initial treatment reached 7.9% and retreatment reached 8.6%.

*Table 3. Abnormal blood sugar in patients with pulmonary tuberculosis*

Classification of patients	Total	Number of patients with diabetes mellitus	Incidence of diabetes mellitus(%)	IGT Number	IGT rate(%)
Treatment of tuberculosis	2108	338	14.6	211	7.1
Retreatment of tuberculosis	1147	261	22.3	145	7.9
Total	3255	599	15.9	356	7.4

## 4. Discussion

### 4.1. Comparison of Clinical Manifestations between Simple Pulmonary Tuberculosis Group and Type 2 Diabetes Mellitus Complicated with Pulmonary Tuberculosis

(1) 3683 cases of cough and cough in simple tuberculosis group, 3233 cases of cough and cough in type 2 diabetes mellitus complicated with pulmonary tuberculosis, 450 cases of hemoptysis in type 2 tuberculosis, hemoptysis in type 2 diabetes mellitus and tuberculosis group; 382 cases of type 2 diabetes mellitus in simple tuberculosis group There were 375 cases of short tuberculosis in the tuberculosis group, 568 cases of chest pain in the simple tuberculosis group, 560 cases of chest pain in type 2 diabetes mellitus complicated with pulmonary tuberculosis group; 86 cases of weight loss in the simple tuberculosis group, 2 cases of type 2 diabetes mellitus complicated with tuberculosis group; 2906 cases of simple pulmonary tuberculosis group, type 2 There were 2984 cases of diabetes mellitus complicated with pulmonary tuberculosis group; 2659 cases of night sweats in tuberculosis group, 1376 cases of night sweat in type 2 diabetes group with tuberculosis group, 2567 cases of fever in tuberculosis group alone, and 1932 cases of type 2 diabetes with tuberculosis group. The rate of hemoptysis and chest pain in the simple pulmonary tuberculosis group was higher than that in the diabetes mellitus. Other clinical manifestations (such as cough, cough, shortness of breath, weight loss, fatigue, night sweats and fever) were not significantly



different between the two groups ( $p>0.05$ ), as shown in Figure 1:

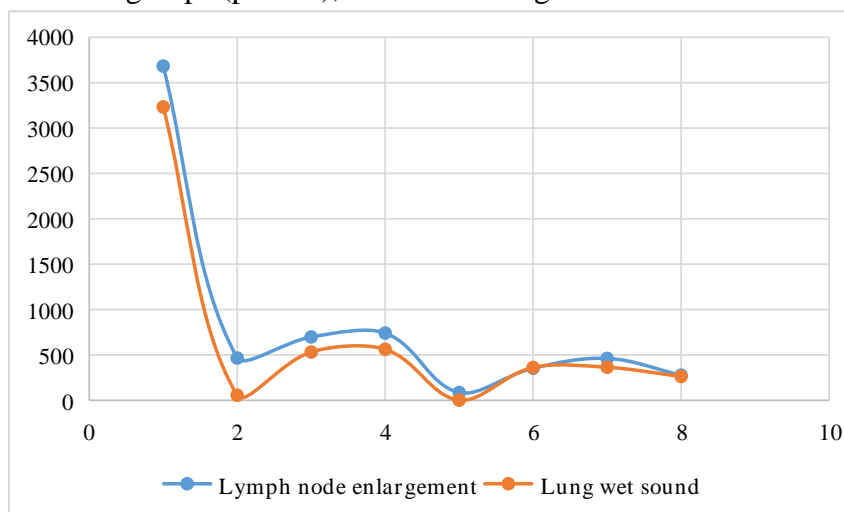


Figure 1. Comparison of pulmonary tuberculosis symptoms in patients with simple pulmonary tuberculosis and type 2 diabetes

(2) The study was showed that the rate of tuberculosis with diabetes was as high as 22.3%, which was higher than that without diabetes. The difference was statistically significant, indicating that the tuberculosis rate increased significant after tuberculosis complicated with diabetes, and also Suggested that we were in the clinic. Attention should be paid to the contagiousness of patients with pulmonary tuberculosis and diabetes, otherwise it will have a greater impact on society if it is not found in time. More attention should be paid to the importance of routine Chest X-ray screening for diabetic patients to diagnose tuberculosis as early as possible.

#### 4.2. Comparison of Simple Pulmonary Tuberculosis Group and Type 2 Diabetes Complicated with Pulmonary Tuberculosis Group

(1) The positive rate of GeneXpertMTB in patients with diabetes mellitus complicated with pulmonary tuberculosis and pulmonary tuberculosis was significantly higher than that of acid-fast bacilli smear ( $p<0.05$ ). However, there was no significant difference in the positive rate of GeneXpertMTB And acid-fast smear test in patients with simple pulmonary tuberculosis ( $p>0.05$ ), as shown in Figure 2.

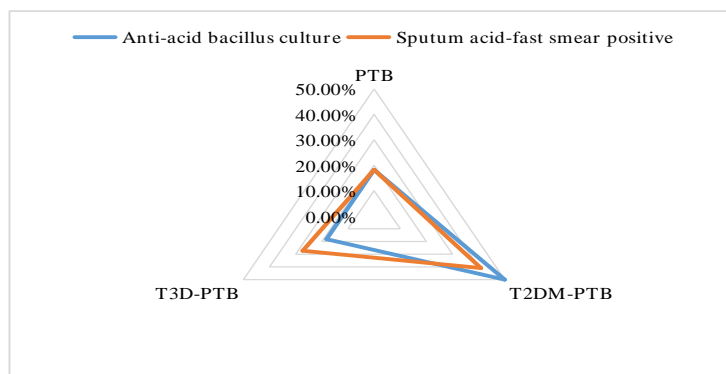


Figure 2. Diabetes with pulmonary tuberculosis with tuberculosis, GeneXpertMTB

(2)The rate of pulmonary voice in the simple pulmonary tuberculosis group was higher than that in the type 2 diabetes mellitus complicated with pulmonary tuberculosis group ( $p<0.05$ ). There was

no statistically significant difference in the incidence of lymphadenopathy between the two groups. There was no physical examination in the simple pulmonary tuberculosis group and the combined pulmonary tuberculosis group. Significant differences; there was no significant difference in physical examination between type 2 diabetes mellitus and tuberculosis group; as shown in Figure 3.

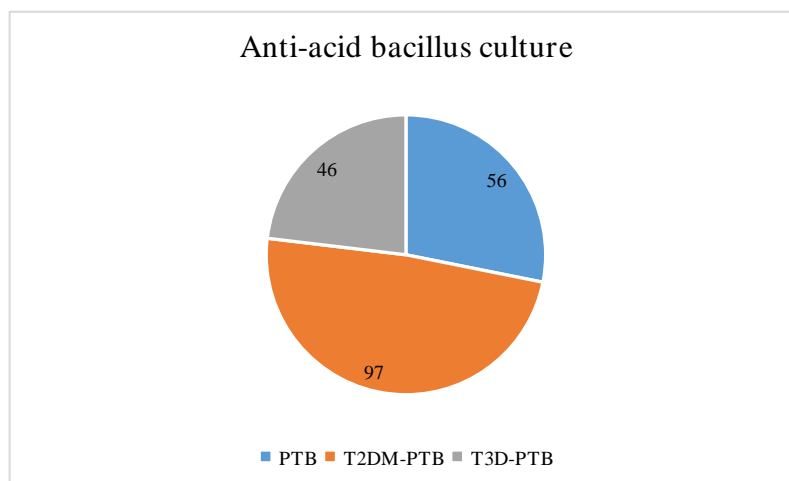


Figure 3. Comparison of physical examinations in the PTB group and the T2DM-PTB group

(3)The rate of fatigue in the simple tuberculosis group was higher than that in the tuberculosis group ( $p < 0.05$ ), while the rate of fever in the HIV-infected tuberculosis group was higher than that in the simple tuberculosis group ( $p < 0.05$ ). Other related clinical manifestations such as cough and cough, There was no significant difference between the two groups in shortness of breath, weight loss, chest pain, hemoptysis and night sweats. The three groups of samples were compared. The measurement data were expressed as mean  $\pm$  standard deviation. The t test was used for comparison. The count data was analyzed by chi-square test. Statistical analysis was performed using SPSS 17.0 soft, with  $\alpha = 0.05$  as the test level,  $p < 0.05$ . , the difference between the samples is statistically significant, as shown in Figure 4.

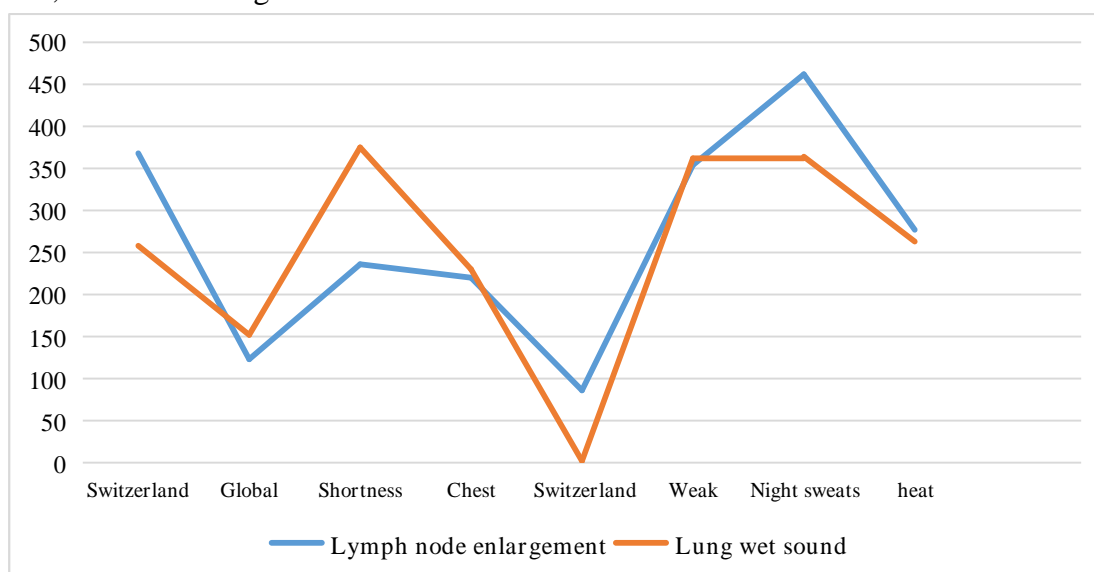


Figure 4. Statistical analysis of the simple pulmonary tuberculosis group and the diabetic group

## 5. Conclusion

(1) The study also showed that the combined recurrence rate of pulmonary tuberculosis patients with diabetes was as high as 20.3%, which was higher than the initial treatment rate of 13.5%. The difference was statistically significant, indicating that the presence of diabetes increased the risk of recurrence of tuberculosis, and high The report is consistent. The presence of diabetes exacerbates the progression of tuberculosis and is one of the causes of tuberculosis recurrence. It also suggests that we should routinely perform chest X-ray screening in patients with diabetes who have a history of tuberculosis in clinical work.

(2) Up to now, the academic community has reached a consensus on whether diabetes increases the risk of tuberculosis. Relevant basic research shows that metabolic disorders and immunosuppression may be the key causes of tuberculosis in diabetes. In addition, there are differences in imaging data between patients with diabetes mellitus complicated with tuberculosis, sputum vaginal time, drug-resistant tuberculosis, and tuberculosis recurrence. The occurrence of diabetes often leads to the deterioration of tuberculosis and the prolongation of sputum bacillus. The occurrence of multidrug-resistant tuberculosis. In view of the rising incidence of diabetes and its serious impact on the tuberculosis epidemic, the implementation of active prevention and control measures is imperative. Diabetes screening for tuberculosis patients with atypical imaging findings in order to detect diabetic patients with tuberculosis in a timely manner. Early diagnosis and treatment can prevent the occurrence of diabetes with tuberculosis to some extent, and at the same time change the treatment plan, such as prolonging the resistance. Tuberculosis treatment time, etc., in order to achieve better clinical results. On the other hand, strengthen the study of diabetic tuberculosis, increase the prospective cohort study or randomized controlled trial to identify the current problems between the two, and explore the risk factors and prevention strategies of diabetes with tuberculosis.

(3) In summary, in clinical work, on the one hand, *we* should pay attention to the routine monitoring of blood glucose in tuberculosis patients, early detection of abnormal blood glucose, early intervention, to greatly reduce the difficulty of treatment of tuberculosis, shorten the course of treatment, reduce contagiousness To improve the success rate of early treatment of both diseases and reduce mortality. On the other hand, we should pay more attention to routine chest X-ray screening for diabetic patients to diagnose pulmonary tuberculosis early. Because patients with diabetes and tuberculosis often lack typical symptoms, when there are obvious respiratory symptoms, the condition is often very serious, difficult to treat, and even combined with critical conditions such as diabetic ketoacidosis.

## Funding

This article is not supported by any foundation.

## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

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