OCTOBER-DECEMBER 2012

MEDICAL CHANNEL

Original Article

PREVALENCE OF IMPAIRED GLUCOSE TOLERANCE IN PULMONARY TUBERCULOSIS

1. KOURO MAL
2. AFTAB HUSSAIN SHAH
3. BASHIR AHMED SHAIKH
4. SHAIKH KHALID
5. AZIZULLAH JALBANI

1 *Assistant Professor Medicine,* Chandka Medical College (CMC) & Hospital Larkana.
2 *Associate Professor of Medicine,* Chandka Medical College (CMC) & Hospital Larkana.
3 *Associate Professor of Medicine,* Chandka Medical College (CMC) & Hospital Larkana.
4 *Consultant physician of Medicine,* Chandka Medical College (CMC) & Hospital Larkana.
5 *Associate Professor Medicine,* Chandka Medical College (CMC) & Hospital Larkana.

CONTACT
DR. KOURO MAL
E-Mail:-kouromal@yahoo.com
Cell: - 0300-3411429

ABSTRACT

Introduction: Tuberculosis is one of the world's deadliest infectious diseases which infects one third of the world's population and kill 1.6 million people each year. On the other hand global burden of diabetes mellitus is going to increase from estimated 180 million currently to 366 million by the year 2030. Both diseases are very common in developing countries like India and Pakistan. Since centuries it was observed that pulmonary tuberculosis is more common in Diabetes Mellitus patients. Recently inverse relation is also observed i.e.-e high prevalence of impaired glucose tolerance in tuberculosis.
Objective: To evaluate the prevalence of diabetes mellitus in pulmonary tuberculosis.
Study Deign: It is cross sectional study.
Site of study: Out patients clinics and wards of chest and general medicine of Chandka Medical College Larkana.
Duration of study: June 2008 to June 2009.
Patients and methods: 136 patients of pulmonary tuberculosis were selected irrespective age sex and duration of symptoms. OGTT was done in all selected patients,
Result: Glucose tolerance test was abnormal in 22 out of 136 patients of pulmonary tuberculosis. Abnormal glucose tolerance is more common in older people (>50 years) and males. It is also seen that abnormality is more common in obese and socioeconomically poor patients who are living in rural areas.
Conclusion: Prevalence of diabetes mellitus is significantly common in patients with pulmonary tuberculosis.

INTRODUCTION

Tuberculosis is one of the world's common and deadliest infectious diseases. Ninety five percent of tuberculosis cases occur in developing countries, where few resources are available to ensure proper treatment and where Human Immunodeficiency Virus (HIV) infection may be common. Tuberculosis continues to infect an estimated one third of world's population, cause disease in 8.8 million people per year, and to kill 1.6 million of those affected. The global burden of diabetes mellitus is going to increase from estimated 180 million currently to 366 million by the year 2030 with the greatest increase in developing countries like Pakistan and India[1,2].

In the nineteenth century pathologist observed that active pulmonary tuberculosis was a common finding at postmortem examination of patients with diabetes mellitus[3]. Since then there has been large number of reports upon higher prevalence of pulmonary tuberculosis in diabetic patients[4,5,6]. Inverse relationship, i.e. high prevalence of diabetes mellitus or impaired glucose tolerance in tuberculoses patients is also being observed since decades[7,8]. In this paper we study the prevalence of impaired glucose tolerance test in patients of pulmonary tuberculosis, because both diseases are very common in our part of the world.

PATIENTS AND METHODS

This is a cross sectional study conducted in outpatient clinics and wards of chest and

TABLE – I.
AGE SPECIFIC ABNORMAL GLUCOSE TOLERANCE TEST AMONG TUBERCULOSIS PATIENTS

Age group	Number	+ ve OGTT	P values	OR (95% CI)
18 – 30	32	3	0.232	0.46 (0.12 – 1.67)
31 – 40	38	5	0.552	0.72 (0.24 – 2.11)
41 – 50	36	7	0.535	1.36 (0.50 – 3.68)
51 - 60	30	7	0.228	1.84 (0.67 – 5.05)

TABLE – II.
GENDER, SMEAR POSITIVITY AND SOCIAL SETUP (RURAL / URBAN) RELATED ABNORMAL OGTT IN TUBERCULOSIS PATIENTS.

CHARACTER	NUMBER	+ ve OGTT	P VALUES	OR (95% CI)
Male	71	14	0.241	1.75 (0.68 – 4.49)
Female	65	8		
Rural	108	16	0.397	0.63 (0.22 – 1.81)
Urban	28	6		
Smear + ve	54	12	0.120	2.05 (0.81 – 5.16)
Smear - ve	82	10		

TABLE – III.
ABNORMAL ORAL GLUCOSE TOLERANCE TEST (OGTT) RELATED TO BODY MASS INDEX (BMI) IN TUBERCULOSIS PATIENTS

BMI	NUMBERS	+ ve OGTT	P values	OR (95% CI)
< 18	53	5	0.088	0.40 (0.14 – 1.17)
18 –24.9	45	7	0.890	0.93 (0.35 – 2.48)
25 – 29.9	32	8	0.121	2.14 (0.80 – 5.70)
>30	6	2	0.472	2.75 (0.47 – 16.0)

general medicine of chandka medical college Larkana from June 2008 to June 2009. Study group consist of 136 patients of age between 18 to 60 years. Among 136 patients 71 males, while 65 were females. Those patients were Included in study who had either positive sputum smear for acid fast bacilli or had clinical and radiological features of pulmonary tuberculosis. Patients with known history of diabetes mellitus were excluded from study. Also those patients who were on medication that could influence glucose tolerance tests were also excluded from study.

Blood samples for fasting glucose level were taken after 10 hours of fasting in the morning. After oral administration of 75 grams of glucose, blood glucose levels were checked at 1, 2 and 3 hour. Results were evaluated according to criterion laid down by WHO for diabetes mellitus[9].

The patient's information was collected regarding age, sex, socioeconomic status, occupation, weight and height. Also asked were symptoms related to pulmonary tuberculosis and diabetes mellitus, family and past history of disease and history of addiction.

RESULT

Out of 136 patients of pulmonary tuberculosis 22(16.17) had abnormal glucose tolerance test (GTT), of which 3(2.2%) had impaired fasting glycaemia, 14 (10.29%) had impaired glucose tolerance and 5(3.67%) were frankly diabetics.

Result of oral glucose tolerance is shown in Table 1 in relation to age. Number of impaired glucose tolerance patient is increased which increasing age, 8 out of 30 cases in patients above 50 years of age.

In relation to sex, result of oral glucose tolerance test is shown in Table 2. Relative number of impair glucose tolerance is more in males as compared to females, 14 and 8 respectively (19.71% vs. 13.11%).

Table -3 shows the incidence of abnormal glucose tolerance test in relation to body mass index. It is seen that incidence is increase with increasing body mass index i.e.-e 33% in obese patients, 25% in over weight patients.

Majority of tuberculosis patients belong to rural population, 108 (79.44%) out of 136 patients. It is seen that abnormal glucose

tolerance is more in urban population as compared to rural. The ratio of diabetes is 14.8% (16 out of 108) in rural population. Most patients in study were poor socio economically and there is no difference in abnormal glucose tolerance test related to socio economic conditions.

In 54 patients of pulmonary tuberculosis there is positive sputum smear for acid fast bacilli (AFB). Interestingly it is seen that ratio of developing diabetes mellitus is more in AFB positive patients 12(22.22%) out of 54, while in AFB negative is 10 out of 82(12.19%).

Of all the cases studied, fever was the most common symptom (122 out of 136), while second common symptom is cough which was also the most common symptom in patients with impaired glucose tolerance test. Features of diabetes like increase thirst and polyurea is present in 45% (10 patients) of impaired glucose tolerance as compared to non diabetic tuberculosis (2out of 112 patients) On radiological examination, the most common lesion was infiltration in 8 (36.36%), while cavitatory lesion with various fibrosis was seen in 5(22.72%) cases with impaired glucose tolerance test. Lower zone was significantly more commonly involved in those with impaired glucose tolerance test (22.72%).

DISCUSSION

Tuberculosis and diabetes mellitus are very common disease of Asia especially India and Pakistan [7]. Higher prevalence of tuberculosis in diabetic patients is well known fact[4,5]; the suspected reason was decreased immune response in diabetic patients and hyperglycemia as a good growth medium for tuberculosis bacilli. The impaired glucose tolerance in a tuberculosis population is also being increasingly realized. In our study out of 136 patients of pulmonary tuberculosis, the prevalence of abnormal glucose tolerance was 22(16.77%). This result was statistically significant and compares to those found in studies of MK Jain et al[8] (2006) 16.98%, yamagishi et al[10] (2000)14.1%, mugusi et al[11](1990) 19% and basuglo et al[12] (1999) 19%.

The present study revealed that with the increasing age number of impaired glucose tolerance is increased in tuberculosis patients. The higher prevalence of impaired glucose tolerance is elderly patients was also observed in by yamagishi et al [10](2000) and basuglo et al[12] (1999). This is also routine prevalence of diabetes mellitus that it increases with increasing age.

The prevalence of developing diabetes is more in males and, M K Jain et al[8] (2006) and yamagishi et al[10] (2000) also found the same observation. Majority of patients with impaired glucose test were obese and overweight this may be due to increased prevalence of diabetes mellitus in obese patients.

The symptoms of tuberculosis like fever and cough were more frequently present in impaired glucose tolerance test patients and also sputum for AFB smear is more positive in impaired glucose tolerance test patients. This observation may be due to more severe and extensive disease in diabetic patients. In patients with impaired glucose tolerance test and tuberculosis, radiologic findings were also more extensive and involve lower zone more frequently, in contrast to non diabetic tuberculosis patients in which lower zone is rarely involved[13,14].

Several theories have been put forward to explain why tuberculosis patients develop glucose intolerance, zack et al[15] (1973) suggested that glucose intolerance was not merely a reaction to acute tuberculosis infection but rather a prediabetic state.

Acute severe stress, fever, inactivity and malnutrition stimulate the stress hormones epinephrine, glucagon, and cortisole which raise the blood sugar level (Guptan et al 2000)[16]. Roychoundary and sen[17](1980) suggested tuberculosis of pancreases as a possible cause. One of the theory suggested by Schwartz & has[18] (2003) is that amyloidosis, by product of chronic infection is deposited in pancreas. Similarly the higher incidence of chronic calcific pancreatitis occurs in patients of diabetes and pulmonary tuberculosis leading to relative or absolute deficiency of insulin.

CONCLUSION & RECOMMENDATION

It is concluded that prevalence of developing diabetes mellitus is significantly high in pulmonary tuberculosis patients, so glucose tolerance test should be done in every patient with pulmonary tuberculosis.

REFERENCE

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes estimates for the year 2000 and projection for 2030. Diabetes care 2004; 27:1047-53.
2. World health organization. Global tuberculosis control: surveillance, Planning, Financing, WHO report 2006. Geneva, Switzerland: world health organization, 2006.
3. Warwick MT. Pulmonary tuberculosis and diabetes mellitus. Journal of med 1987; 101: 31-36.
4. Alisjahban B, Vancrevel R, Sahiratmadja E, Et al. Diabetes mellitus is strongly associated with tuberculosis in Indonesia Int J Tuber lung disease 2006; 10: 696-700.
5. Kim S J, Hong y p, Lew w j, yang S c, Lee E G, Incidence of pulmonary tuberculosis in diabetes, Tuber lung disease. 1995; 76 529-533.
6. Morris JT, Sea worth BJ, MC allister C K, pulmonary tuberculosis in diabetes. Chest. 1992: 539-41.
7. Bloom JD. Glucose intolerance is pulmonary tuberculosis. Am Rev Rep Dis. 1969; 100: 38-41.
8. Jain MK, Baghel PK, Agrawal R, Study of impaired glucose tolerance in pulmonary tuberculosis. Indian Journal of community Medicine 2006; 31: 137-139.
9. American diabetes association: diagnosis and classification of diabetes mellitus. Diabetic care 2006; 29(suppl 1): 534-48.
10. Yamagishi F, Sasaki Y, yagi J, Yamalani H, Kuroda F. frequency of complications of diabetes mellitus in pulmonary tuberculosis. Kekkaku 2000; 75 (6): 435-7.
11. 14 Mugusi F, Swai ABM, Alberti KGMM, Mclarity PG. Increase prevalence of diabetes mellitus in patients with pulmonary tuberculosis in tanzania. Tuberculosis 1990; 71: 271-76.
12. Basuglo DK, Bacakoglu F, Coka, Sayiner A, Ates M. The oral glucose tolerance test in patients with respiratory infections monalidi arch for chest dis 1969; 54(54): 307-10.
13. Umut S, tosum GA, Yildirim N. Radiographic location of pulmonary tuberculosis in diabetes patients. Chest 1994; 109: 162-3.
14. Shiakh MA, Singla R, Khan NB, Sharif NS, Saigh MO. Does diabetes alter the radiological presentation of pulmonary tuberculosis. Saudi Med J 2003; 24: 278-81.
15. Zack MB, Fulkerson LL, Stein E. Glucose Intolerance in pulmonary Tuberculosis. Amer Rev Resp Dis 1973; 108: 1164-9.
16. Guptan A, Shah A. Tuberculosis and Diabetes: An appraisal. Ind J tub 2000; 47(3): 3-8.
17. Roychoudhary AB, Sen PK. Diabetes in Tuberculosis Patients. JIMA 1980; 74: 8-13.
18. New article in press: Diabetes Mellitus, Tuberculosis and Mycobacteria, Two Millennia of Enigma, by Lawrence Broxmeyer MD. White Stone New Yark July 04, 2005. Health News.