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To assess clinical profile of oral glucose tolerance in pulmonary tuberculosis patient

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Abstract
Introduction: Tuberculosis (T.B), which is one of the oldest disease known to affect human and is likely to have existed in pre hominids, is a major cause of death worldwide. This disease is caused by bacteria of the mycobacterium tuberculosis complex and usually affects the lungs, although other organs are involved in upto one- third of cases. Diabetes Mellitus (D.M.) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia.
Subject and Methods: In this study 75 newly diagnosed cases of pulmonary tuberculosis patients were evaluated. A cross section of both male and female diagnosed case of pulmonary tuberculosis attending the outdoor and indoor of various department were taken into study. A detailed history, clinical examination and relevant investigations were performed. Collected data were analysed by using appropriate software.
Result: This study of 75 cases showed overall incidence of impaired glucose tolerance as 17.33% in patients with pulmonary tuberculosis. Among 82.67% patients GTT was normal (Fasting <110mg/dl and 2 hours <140mg/dl). In 16.00 % of patients impaired glucose tolerance (fasting < 126 mg/dl and 2 hours > 140 mg/dl) was recorded and among 4 % patients diabetes mellitus (fasting > 126mg/dl and 2hours >200 mg/dl) was diagnosed.
Conclusion: This study showed no statistically significant association of sex, age and chest X-ray findings in patients with pulmonary tuberculosis and diabetes mellitus.

Keywords: oral glucose tolerance, pulmonary tuberculosis patient

Introduction
Tuberculosis (T.B), which is one of the oldest disease known to affect human and is likely to have existed in pre hominids, is a major cause of death worldwide. This disease is caused by bacteria of the mycobacterium tuberculosis complex and usually affects the lungs, although other organs are involved in upto one- third of cases. If properly treated, T.B. caused by drugs susceptible strains is curable in virtually all cases. If untreated the disease may be fatal within 5 years in 50-65% of cases. Transmission usually takes place through the air borne spread of droplet nuclei produced by patients with infectious pulmonary T.B. [1]
In healthy people, infection with mycobacterium tuberculosis often causes no symptoms, since the person immune systems adds to "wall off" the bacteria. The symptoms of active T.B. of the lungs are coughing sometimes with sputum or blood, chest pain, weakness, weight loss, fever and night sweats.
According to WHO GLOBAL TUBERCULOSIS REPORT 2019, Globally, an estimated 10.0 million (range, 9.0–11.1 million) people fell ill with TB in 2018. The burden of disease varies enormously among countries, from fewer than five to more than 500 new cases per 100 000 population per year, with the global average being around 130. There were an estimated 1.2 million (range, 1.1–1.3 million) TB deaths among HIV-negative people in 2018 (a 27% reduction from 1.7 million in 2000), and an additional 251 000 deaths (range, 223 000–281 000) among HIV positive people (a 60% reduction from 620 000 in 2000) [2].
The Impact of T.B. can be devastating especially in developing countries suffering from high burdens of both T.B. and HIV infections. According to India TB report 2019 published by Govt of India, in 2018, India was able to achieve a Total Notification of 21.5 Lakh TB cases of which 25 % was from the private sector. Majority of the TB burden is among the working age group. The 89% of TB cases come from the age group of 15-69 years. About 2/3 of the TB cases are Males.

Uttar Pradesh, with 17% of population of the country, is the largest contributor to the TB cases in with 20% of the total notifications [3].

Despite dramatic improvements in public health and medical care, mycobacterium tuberculosis remains as much of a threat in the 21st century as it was when first identified as a pathogen by Koch in 1882. Tuberculosis is a major cause of mortality and morbidity throughout the world

In recent years, strong evidence has been gathered to confirm a link between TB and yet another disease diabetes mellitus. That link had been suspected for centuries [4].

Diabetes Mellitus (D.M.) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia [5]. It is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both [6].

The vast majority of cases of the diabetes fall into two broad categories: those having little or no endogenous insulin secretory capacity (IDDM or type 1 DM) and those who retain endogenous insulin secretory capacity but have a combination of resistance to insulin action and an inadequate compensatory insulin secretory response (NIDDM, or Type 2 DM) [6, 7].

According to international diabetes federation, 2019, An estimated 463 million adults aged 20–79 years are currently living with diabetes. This represents 9.3% of the world's population in this age group. The total number is predicted to rise to 578 million (10.2%) by 2030 and to 700 million (10.9%) by 2045 [8]. The prevalence of diabetes and its adverse health effects have risen more rapidly in South Asia than in any other region of the world [9].

Thirty years ago, the prevalence of diabetes in India based on the Indian Council of Medical Research (ICMR) multicentric survey [10] was around two percent in urban India and one percent in rural India. In just three decades, these prevalence rates have shot up to 12 to 16% in urban India and three to eight percent in rural India, in adults over 20 years of age. Indeed, India is now referred to as the "Diabetic Capital" of the world. Further, DM is associated with several complications.

Several recent publications have described the association between diabetes and TB, specifically the increased prevalence of active TB among patients with diabetes and the poorer treatment outcomes in these patients when compared to those without diabetes [11, 12]. The link between these two diseases may become even more meaningful in coming years, as the prevalence of obesity and diabetes are expected to rise dramatically in the resource-poor areas where TB thrives [13].

The evidence that diabetic patient have an increased risk of developing pulmonary tuberculosis is a well-known. Unlike patients of diabetes developing tuberculosis where the disease tends to be extensive and bilateral. What makes the diagnosis of the combination difficult is the fact that the symptoms of the complicating disease are masked by the co-existing disease [14].

Aims and Objective

To assess clinical profile of oral glucose tolerance in pulmonary tuberculosis patients

Materials and Methods

In this study 75 newly diagnosed cases of pulmonary tuberculosis patients were evaluated. A cross section of both male and female diagnosed case of pulmonary tuberculosis attending the outdoor and indoor of various department were taken into study.

Inclusion criteria

- Patients with positive sputum smear for acid fast bacilli
- Patients with chest x ray features suggestive of pulmonary tuberculosis
- Patient aged between 30 and 65 years

Exclusion criteria

- Type 1 diabetes mellitus
- Patient with diabetes mellitus
- Previously diagnosed and treated patients of pulmonary tuberculosis

A detailed history, clinical examinations and relevant investigations was performed as follows

1. History

- Age, sex duration of illness like fever, cough with sputum or blood, chest pain, weakness, weight loss and night sweats.
- Past history and family history of pulmonary tuberculosis and diabetes
- Personal medical history

2. General examinations

Pallor, oedema, cyanosis, icterus, clubbing, blood pressure.

3. Clinical examinations

A detailed clinical examination was performed as follows

Body mass index

Respiratory system examination

Investigations

- Blood group
- Hemogram – hemoglobin, total count, differential count, erythrocyte sediment rate

B. Sputum for acid fast bacilli

Sputum smears for AFB was done and graded according to RNCTP GUIDELINES as per 0 with AFB per 100 oil immersion fields, scanty with 1-9 AFB per 100 oil immersion fields, grade + with 10-99 AFB per 100 oil immersion fields, grade ++ with 1-10 AFB per field (examine 50 fields), grade +++ is more than 10 AFB per field (examine 20 fields)

C. Chest X-ray

Infiltration, cavitation, fibrosis, fibrocavitory lesions, military mottling along with different zones involved

D. Oral glucose tolerance test

Samples of blood were taken according to the WHO guidelines after the patient fasted overnight for atleast 12 hours, then at 1 and 2 hours following 75 grams glucose ingestion. Based on these results, patients with impaired glucose tolerance will be subjected to fasting and post prandial blood sugar levels to confirm the diabetes status.

Result

Table 1: Sex Distribution

Sex	Number	Percent
Male	63	84
Female	12	16
Total	75	100

In the present study 84% patients were males and 16% were female with male to female ratio 5.25:1

Table 2: Age distribution

Age Group(Year)	Number	Percent
31 to 40	18	24.00
41 to 50	22	29.33
51 to 60	25	33.33
>60	10	13.33
Total	75	100.00

Most common age group was 51 to 60 years (33.33%) followed by 41 to 50 yrs (29.33%)

Table 3: Sputum for Acid fast bacilli

AFB Finding	Sample 1(n=75)		Sample 2(n=75)	
	Number	Percent	Number	Percent
Normal	15	20.00	13	17.33
+	55	73.33	57	76.00
++	5	6.67	5	6.67
+++	0	0.00	0	0.00
Total	75	100.00	75	100.00

AFB findings showed + in 73.33% on sample 1 and 76.00% on sample 2. However 6.67% each showed ++ on sample 1 and 2.

Table 4: X- Ray findings

X-Ray findings	Number	Percent
Normal	17	22.67
Infiltration	37	49.33
Cavitatory lesion	10	13.33
Fibrotic changes	11	14.67
Total	75	100.00

Almost half (49.33%) of patients had infiltration , 14.67% had fibrotic changes where as 13.33% had cavitatory lesion.22.67% of patients had normal chest X ray.

Table 5: Glucose tolerance test

Glucose tolerance (mg/dl)	Number	Percent
Normal	60	80.00
Impaired fasting glycaemia	0	0.00
Impaired glucose tolerance	12	16.00
Diabetes mellitus	3	4.00
Total	75	100.00

80.00% patients OGTT was normal (fasting <110 mg /dl and 2 hours < 140 mg/dl). In 16.00% of patients impaired glucose tolerance (fasting <126mg/dl and 2 hours>140mg/dl) was recorded and among 4% patients diabetes mellitus (fasting >126 mg/dl and 2 hours >200 mg/dl) was diagnosed. However, no patient had impaired fasting glycaemia.

Table 6: Final diagnosis of DM based on FBS and PPBS

Diagnosis	FBS>110mg/dl (n=3)		PPBS >200 mg/dl (n=3)	
Confirmed	3	100.00	3	100.00
Non Confirmed	0	0.00	0	0.00
Total	3	100.00	3	100.00

4 % of patients with diabetes (fasting >126 mg/dl and 2 hours >200 mg/dl based on glucose tolerance test were subjected to FBS and PPBS). These test confirmed diagnosis of diabetes mellitus among all the patients.

Table 7: Incidence of Impaired glucose tolerance in patients with pulmonary tuberculosis

Glucose Tolerance (mg/dl)	Number	Percent
Normal	60	82.67
Impaired	15	17.33
Total	75	100.00

In the present study overall incidence of impaired glucose tolerance was 17.33% (including three cases of confirmed diabetes mellitus)

Table 8: Association of Impaired glucose tolerance with sex

Sex	Impaired GT(n=15)		Normal (n=60)		Total	
	No	Percent	No	Percent	No	Percent
Male	11	17.46	52	82.53	63	100.00
Female	4	33.33	8	66.67	12	100.00

In the present study 33.33% of female had impaired glucose tolerance compared 17.46% males. Though females showed higher impaired glucose tolerance compared to males. This difference was statistically not significant.

Table 9: Association of Impaired glucose tolerance with age

Age Group (years)	Impaired GT(n=15)		Normal(n=60)		Total	
	No	Percent	No	Percent	No	Percent
31 to 40	3	16.67	15	83.33	18	100.00
41 to 50	6	27.278	16	72.73	22	100.00
51 to 60	4	16.00	21	84.00	25	100.00
>60	2	20	8	80.00	10	100.00

16.67%, 27.27%, 16.00%, 8.20% patients aged between 31 to 40, 41 to 50, 51 to 60 and more than 60 years has impaired glucose tolerance. However this difference was statistically not significant.

Table 10: Association of impaired glucose tolerance with x-ray findings

X-ray findings	Impaired GT (n=15)		Normal (n=60)		Total	
	No	Percent	No	Percent	No	Percent
Normal	1	5.88	16	94.12	17	100.00
Infiltration	11	29.73	26	70.27	37	100.00
Cavitatory lesion	0	0.00	10	100.00	10	100.00
Fibrotic changes	3	27.27	8	72.73	11	100.00

29.73% of patients showing infiltrations on chest x-ray findings had impaired glucose tolerance followed by 27.27% with those having fibrotic changes. no statistically significant difference was noted between patients with different chest x-ray findings.

Summary

The relation of pulmonary tuberculosis and development of altered OGT are not well documented and very few studies have reported that the incidence of diabetes mellitus in patients with pulmonary tuberculosis. The present study was aimed to find the incidence of OGT and its clinical profile in patients with pulmonary tuberculosis.

The results showed majority of the patients were males

(84%) with male to female ratio 5.25:1.The most commonest age group was 51 to 60 years (33.33%) followed by 41 to 50 years (29.33%).The commonest presentation of pulmonary tuberculosis was fever (69.33%) followed by cough and sputum (68.00% each) and diabetic signs in 8 % of patients each were polyuria and polydipsia. AFB findings showed + in 73.33% patients on sample 1 and 76.00% patients on sample 2.on chest x-ray almost half (49.33%) of the patients had infiltration.

This study of 75 cases showed overall incidence of impaired glucose tolerance as 17.33% in patients with pulmonary tuberculosis. Among 82.67% patients GTT was normal (Fasting <110mg/dl and 2 hours <140mg/dl). In 16.00 % of patients impaired glucose tolerance (fasting < 126 mg/dl and 2 hours > 140 mg/dl) was recorded and among 4 % patients diabetes mellitus (fasting > 126mg/dl and 2hours >200 mg/dl) was diagnosed. No statistically significant association of sex, age and chest x-ray findings was seen in patients with pulmonary tuberculosis and diabetes mellitus.

Conclusion

The present study of 75 cases showed overall incidence of impaired glucose tolerance as 17.33% in patients with pulmonary tuberculosis among 82.67% patients GTT was normal (Fasting < 110 mg/dL and 2 hours < 140 mg/dL). In 16.00% of patients impaired glucose tolerance (Fasting < 126 mg/dL and 2 hours > 140 mg/dL) was recorded and among 4% patients diabetes mellitus (Fasting > 126 mg/dL and 2 hours > 200 mg/dL) was diagnosed. No patient had impaired fasting glycemia. This study showed no statistically significant association of sex, age and chest X-ray findings in patients with pulmonary tuberculosis and diabetes mellitus.

References

1. Abbras CK. Fc receptor-mediated phagocytosis: abnormalities associated with diabetesmellitus. Clin Immunol Immunopathol. 1991; 58:1-17.
2. Global tuberculosis report 2019. Geneva: World Health Organization, 2019, 1. Licence: CC BY-NC-SA 3.0 IGO.
3. India TB report, central TB Division, MOHFW, GOI, 2019, 9.
4. Bacakoglu F, Basoglu OO, Cok G, Sayiner A, Atres M. Pulmonary tuberculosis in patients with diabetes mellitus. Respiration, 2000; 68:595-600.
5. Harrison's principles of Internal Medicine, 20th edition, 2018, 2850.
6. Badak FZ, Kiska DL, Setterquist S, Hartley C, O'Connell MA, Hopfer RL. Comparison of mycobacteria growth indicator tube with BACTEC 460 for detection and recovery of mycobacteria from clinical specimens. J Clin Microbiol. 1996; 34(9):2236-9
7. Baker MA, Harries AD, Jeon CY, Hart JE, Kapur A *et al*. The impact of diabetes on tuberculosis treatment outcomes:a systematic review. BMC Med. 2011; 9:81.
8. IDF Diabetes ATLAS Ninth edition 2019, page 34Boehme CC, Nabeta P, Hillemann D, Nicol MP, Shenai S, Krapp F *et al*. Rapid molecular detection of tuberculosis and rifampin resistance. N Engl J Med. 2010; 363(11):1005-15.
9. Boehme CC, Nicol MP, Nabeta P, Michael JS, Gotuzzo E, Tahirli R *et al*. Feasibility, diagnostic accuracy, and effectiveness of decentralised use of the Xpert MTB/RIF test for diagnosis of tuberculosis and multidrug resistance:a multicentre implementation study. Lancet. 2011; 377(9776):1495-505.
10. Boucot KR, Dillon ES, Cooper DA, Meier P, Richardson R. Tuberculosis among diabetics: the Philadelphia survey. Am Rev Tuberc. 1952; 65:1-50.
11. Brodie D, Schluger NW. The diagnosis of tuberculosis. Clin Chest Med. 2005; 26(2):247-71.
12. Brohall G, Behre CJ, Hulthe J, Wikstrand J, Fagerberg B. Prevalence of diabetes and impaired glucose tolerance in 64-year-old Swedish women:experiences of using repeated oral glucose tolerance tests. Diabetes Care. 2006; 29:363-7
13. Brown M, Varia H, Bassett P, Davidson RN, Wall R, Pasvol G. Prospective study of sputum induction, gastric washing, and bronchoalveolar lavage for the diagnosis of pulmonary tuberculosis in patients who are unable to expectorate. Clin Infect Dis. 2007; 44(11):1415-20.