Original Research Article

Clinicoradiological profile of Diabetes Mellitus with MDR-TB

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Abstract

Background: Studies have established the bidirectional link between diabetes and TB. It is hypothesized that diabetes worsens the clinical course of TB treatment. Furthermore, in TB, the glycemic control in diabetics is impaired. A plausible hypothesis of TB correlation is the impaired host defense in individuals in diabetics. Currently, there is limited research work on diabetes mellitus (DM) in TB patients; none in the study area. Also there are very limited studies depicting the clinico-radiological profile of DM in MDR TB. In this backdrop, the current study was conducted with an objective to establish a correlation with the severity of diabetes (HbA1C) with the clinical and radiological finding (Chest X-ray).**Methodology**-A Retrospective cross-sectional study of267 MDR TB cases enrolled in GANDHI MEDICAL COLLEGE BHOPAL from November 2019 to November2020. Patients with Known case of DM &DRTB with atleast rifampicin resistant were included. Self-reported information on age, sex, address, symptoms at presentation and treatment history of TB(Old & New) &DM was collected by trained investigators. Chest x ray was then evaluated & correlated by trained professionals on different parameters. **Results-** Among 267 patients 12.7 % of cases are DM-MDR TB Coinfected .Maximum cases was found among 40-60 year age group with male predominance. Severity of symptoms & maximum radiological involvement was found in severe uncontrolled diabetes. Also DM-MDR TB Coinfection more common among patients with history of TB as compared to patients with no history of TB. According to study results Significant p value was found in radiological & symptomatic correlation with HbA1c in MDR TB patients but P value was not significant in patients with old h/o TB.**Conclusion-** Early detection can help improve care and treatment outcomes of both diseases. All people with TB should be systematically screened for diabetes. Patients with old h/o TB are at increased risk of reactivation, reinfection. Xray & and timely detections of symptoms could be used as an important screening tool.

Keywords: DM, MDR-TB, Cross Sectional.

Introduction

Tuberculosis is a global public health problem causing illness among millions each year [1]. Globally in 2019, there were an estimated 10 million new TB cases, Of these incident cases of TB in 2019, an estimated 1.9 million were attributed to undernourishment, 1.0 million to HIV, 0.8 million to smoking, and 0.8 million to diabetes [1] . The care and control of tuberculosis are threatened by the emergence and amplification of multi-drug resistant tuberculosis (MDR-TB)[2]. The global diabetes mellitus (DM) epidemic poses a significant bottleneck to the TB control program [3, 4]. The International Diabetes Federation (IDF) estimated that, globally in 2013, 382 million adults have diabetes of whom 80% live in low-and middle-income countries. Further increase in the global burden of diabetes is predicted, reaching 592 million by 2035 [5]. People with diabetes, compared to non-diabetic controls, were two- to three-fold more likely to develop TB [6, 7]. In 2013, an estimated 15% of adult cases of TB worldwide were attributed to diabetes, which corresponds to 1 million cases of diabetes-associated TB per year [3]. Impaired immunity in diabetic patients is thought to contribute to the evolution of latent TB infection to active cases. Moreover, people with TB who have DM have a poorer response to treatment than do those without DM, and are therefore at a higher risk of TB treatment failure, death, and relapse after cure [3, 8]. Treatment failure in turn adds another significant challenge to the global TB control program, a drug-resistant TB [1, 9].The emergence of multi-drug resistance across the world poses a global threat as the treatment is difficult, expensive, and a major healthcare cost burden to developing countries [10]. Most cases of MDR-TB arise from a mixture of physician error, inadequate and incomplete treatment, and patient non-compliance during treatment of susceptible TB [11, 12]. Research reports also indicate that patients with MDR-TB and a co-morbidity of DM have a poor treatment response compared with non-diabetic MDR-TB controls [13].

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Studies have established the bidirectional link between diabetes and TB. It is hypothesized that diabetes worsens the clinical course of TB treatment. Furthermore, in TB, the glycemic control in diabetics is impaired. A plausible hypothesis of TB correlation is the impaired host defense in individuals in diabetics. A recent systematic review demonstrated approximately 3 times higher risk of developing TB in DM patients than no-DM patients. The "Diabetes Capital" of the world, India is projected to account for 62–80 million DM patients by 2030. Diabetes in DSTB in India is 20%whereas in MDR TB it is 11.7%. Currently, there is limited research work on diabetes mellitus (DM) in TB patients; none in the study area. Also there are very limited studies depicting the clinico-radiological profile of DM in MDR TB. In this backdrop, the current study was conducted with an objective to establish a correlation with the severity of diabetes (HbA1C) with the clinical and radiological finding (Chest X-ray).

Materials and Methods

After receiving approval from the ethical committee, a retrospective cross-sectional observational study was carried out at Gandhi Medical College Bhopal, a tertiary care centre, BHOPAL from November 2019 to November2020. Study group of 267 MDR TB cases were enrolled in study during this time span.Self-reported information on age, sex, address, symptoms at presentation and treatment history of TB(Old & New) & DIABETES was collected by trained investigators. Chest x ray was then evaluated & correlated by trained professionals on different parameters.

The X ray involvement was evaluated by seeing 3 different parameters i.e B/L involvement , More than 1 zone involvement , Presence of cavitary lesion & each were given score 1 .Symptoms like Fever , cough , anorexia, weight loss were evaluated. Finally Chest Xray findings and symptoms were co related independently with HBA1C Status of the patient.

The severity of uncontrolled diabetes were classified as

Mild – 6.5 - 8.5

Moderate – 8.5 – 10.5

Severe --> 10.5

Inclusion criteria

Known case of DIABETES mellitus

Known case of DRTB with atleast rifampicin resistant

Exclusion criteria- Other immunosuppressive states like HIV, transplant patient, immunosuppressive therapy patient, cancer patient.

Not giving consent.

Non cooperative patient

Results

After applying inclusion and exclusion criteria, data from 267 MDR TB patients was collected. Patients were classified according to severity of uncontrolled diabetes

Among 267 patients 12.7 % of cases are DM-MDR TB Coinfected.Maximum cases was found among 40-60 year age group with male predominance. Severity of symptoms & maximum radiological involvement was found in severe uncontrolled diabetes. Also DM-MDR TB Coinfection more common among patients with history of TB as compared to patients with no history of TB.

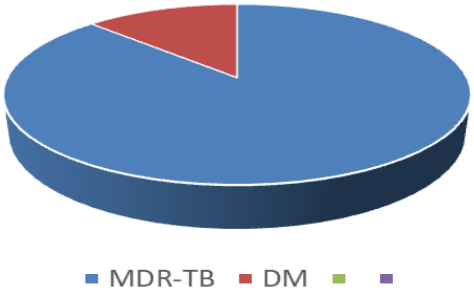


Fig 1: 12.7 % of DM -MDR TB COINFECTED among 267 patients

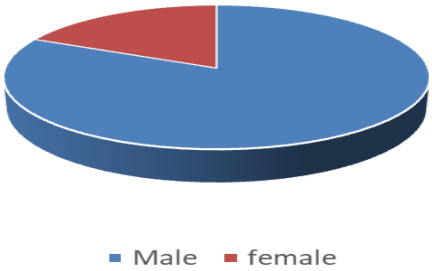
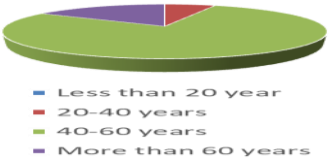


Fig 2: Among enrolled cases 64% were male & 36% were female



Maximum number of patients were found in 40-60 year age groups followed by more than 60 year age group & least among 20-40 year age group. No cases were found in less than 20 year age group.

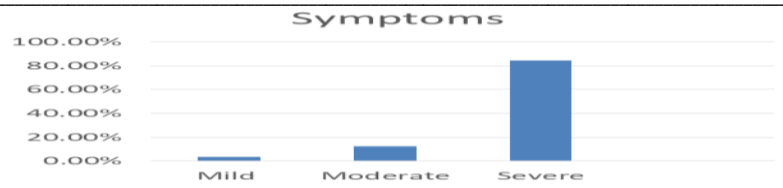


Fig 3: Severity of symptoms increases with increase in HBA1C counts

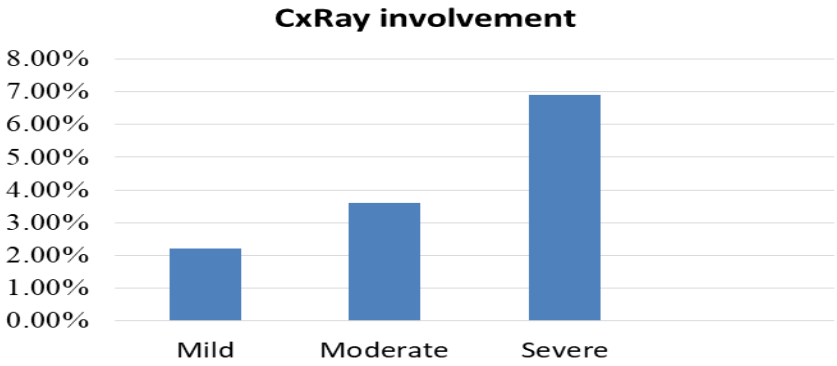


Fig 4: Radiological finding increased with increase in HBA1C counts

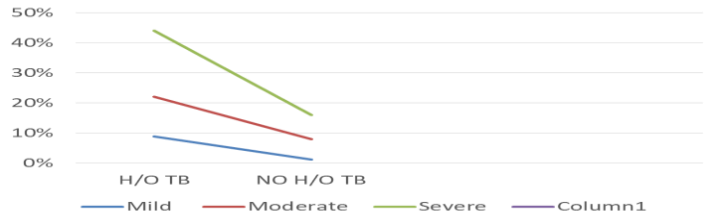


Fig 5: DM-MDR TB cases were least among patients with no previous history of TB as compared to patients with history of TB

Significant p value was found in radiological & symptomatic correlation with HbA1c in MDR TB patients but P value was not significant in patients with old h/o TB .

Discussion

In our study we found patient with history of old tuberculosis were highly susceptible to get MDR TB even after low glycemic index in diabetic patients. Patient with uncontrolled diabetes had more constitutional symptoms on presentation. Linear correlation was seen in glycemic index and chest X-ray involvement. The prevalence of diabetes among MDR TB patients in our study was found to be 12.7%. Most commonly in men (82%) compared to women The age group was more commonly on the elderly side (>40 years) 78%. Patient with high glycemic index had more involvement on chest X-ray with Mild - 2.2 % , Moderate - 3.6 % , Severe- 6.9 %. .

Other studies have shown that, the prevalence as well as incidence of tuberculosis is higher among males than among females. Patel Anand K et al found 73.6% male and 26.4% female, male to female ratio was 2.8:1[14]. Hariprasad et al found 72% male and 28% females [15].Severity of symptoms increases with increase in HBA1C counts which was comparable with the study by Patel Anand K et al [14].We also found that patients with DM in our study had more cavitary lesions. Our finding is in accordance with results of some previous studies [16,17] and the reason proposed was due to uncontrolled glycemic level (HbA1c≥7) . In addition to the presence of diabetes mellitus, our data also revealed that being older than 37 years old, male and had previous TB treatment gave higher risk of developing MDRTB. Previous studies indicated conflicting results for older age as a predisposing factor for MDRTB [18].In our study increase in bilateral lung field with increase in HBA1C counts was found which was comparable with Hariprasad et al [15].

Conclusion

Early detection can help improve care and treatment outcomes of both diseases. All people with TB should be systematically screened for diabetes. Patients with old h/o TB are at increased risk of reactivation, reinfection. Xray and timely detections of symptoms could be used as an important screening tool.

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