Variants of Tuberculosis in Diabetic Populations in Karachi

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MAHN MAS conceived idea, AHN JA AAB drafted the study, AHN AAB collected data, AHN JS did statistical analysis & interpretation of data, AHN MNS critical reviewed manuscript, All approved final version to be published.

Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

Abstract

Background: Tuberculosis is one of the commonest infective disease associated with Diabetes Mellitus (DM) as due to DM immune system become weak.

Objective: The purpose of the present study was to calculate the different variants of active Tuberculosis in the diabetic population.

Methodology: This was a cross-sectional/observational and qualitative study. The diabetics with at least 7 years were interviewed in three outpatients departments (OPD) of Medical, National Institute of Diabetes and Endocrinology, and Ojaha Chest clinic (DUHS) and selected as per inclusion criteria viz. cough with and without expectoration, hemoptysis, prolonged fever and unexplained weight loss. Short duration of diabetes, age less than 12 and more than 80 years and all cases of immunocomprisation and secondary diabetes were excluded. After taking consent, detail history, clinical examination and investigations were analyzed for possible tuberculosis. All the data were entered in the SPSS version 19 for data entry and then analysis from the registered data.

Results: Out of 1100 patients interviewed, 301 cases were selected for possible tuberculosis. Only 39 patients (12.95%) were diagnosed to have active tuberculosis. Mean age was 54.4 ± 11.1, male to female ratio was 1.9:1.5, and mean duration of diabetes found was 11.5 years. All were type 2 diabetics except one which turned out to be type 1. Pulmonary Tuberculosis were found to be 53.88% and extra pulmonary was 46.12%. In the case of pulmonary, the primary was 10.25%, post primary was 17.94% and milliary was 5.12%.. MDR-TB was found in 20.15% of the cases which is almost double in comparison with non diabetics, and the smear positive were found to be among 56.54%.

Conclusion: Tuberculosis frequency is more common in diabetics than in general population. The frequency of extra pulmonary TB is also higher comparing non-diabetics. The diagnosis of the disease should be more prompt in diabetics otherwise MDR-TB can become a serious public health problem among diabetics and non diabetics of this poor country.

Key words: Diabetes; Pulmonary Tuberculosis; Extra pulmonary TB; Variants of TB, Drug-resistance TB

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Introduction

There is a wise saying that Diabetes is the mother of all illnesses.[1] Due to immunomodulation's and altered immunity, diabetic patients are prone to develop notorious disease of Tuberculosis (TB) more frequently than the general population.[2] According to WHO, diabetes is increasing globally worldwide in spite of all preventive efforts.[3] In Pakistan, approximately 9.5% of both urban and rural population suffers from this disease and WHO has ranked 7th in prevalence.[4]

Table 1: Variants of Pulmonary TB; total patients 21 (53.8%)

S.No	Part of the lung involved	No of patients	Smear +
1	Unilateral apical	7	2
2	Bilateral apical	2	1
3	Unilateral apical	2	1
4	Unilateral upper lobe consolidated	2	1
5	Unilateral middle lobe consolidated	3	Nil
6	Unilateral middle lobe	3	1
7	Unilateral pleural effusion	1	Nil
8	Cavitating mass	1	1

Studies have shown that there is a positive correlation between diabetes and tuberculosis. It has also been suggested that TB sufferers are more susceptible to diabetes mellitus.[5] Currently there are around 1.5 million patients of TB in Pakistan, while every year 0.25 million new individuals develop the disease.[6]

In Pakistan according to the several studies and the surveys, the diabetics acquiring TB is 15-20% which is definitely a higher frequency.[7] This study was aimed to see the different variants of TB affecting our diabetic population in comparison to non-diabetics. The inclusion criteria were diabetes of more than 7 years duration within the age group of 12-80 years and diabetes presenting with chronic cough, weight loss and prolonged fever with evidence of biochemical/microbiological/serology.

Exclusion criteria were secondary diabetic patients, patients on steroids and immunosupprestives and polyglandular autoimmune diseases, past H/O tuberculosis with complete ATT with the objective to analyze the different variants of tuberculosis in diabetic populations of Karachi Pakistan.

Methodology

This is an observational and qualitative study with random sample done at National Institute of Diabetes and Endocrinology, medical outpatients department (OPD) and OJHA chest OPD of DUHS, Karachi from 1st June, 2018 to 31st Dec, 2018. The patients were selected by attending physicians on the basis of inclusion criteria. After taking verbal consent, demographic and full medical history, thorough physical examination was done and positive findings were noted. At least 5 investigations were advised, i.e., Blood CBC with ESR, HbA1C, FBS and sputum for 3 samples for DR/AFB and X-ray Chest PA view were recorded. All the information's were entered in the SPSS version 19 for statistical analysis. Duration of diabetes with levels of control and onset of tuberculosis in positive patients were noted and the type of TB was classified on the basis of site of involvement and radiology.

Results

From 1100 diabetic patients who visited in 3 OPDs of DUHS, Ojha Campus, 301 patients had been selected as per inclusion criteria. The mean age of patients was 54.4 ± 11.1 years and median age was 55 years. Male to female ratio was 1.9: 1. At least 58.8% were addicted to some substance especially smoking and gutka. Mean duration of diabetes was 13.5±6.10 years. There was high rate of uncontrolled diabetes as only three patients had HbA_{1c} less than 6%, otherwise the mean HbA1c was 7.36 ± 0.98. From 301patients, 39 (12.9%) were found having active tuberculosis. These patients had long duration of diabetes with mean HbA1c was more than 7%. Twenty two patients had (56.54%) had smear positive TB while seventeen patients (43.58%) had smear negative tuberculosis. Twenty three patients (58.97%) had pulmonary and sixteen patients (41.2%) had extra-pulmonary TB. The different variants of pulmonary and extra-pulmonary tuberculosis are shown in table 1 and table 2 respectively. Table no. 3 is showing overall clinical types of tuberculosis. The vaccination history of BCG was present in 49% of the diabetics.

Discussion

There is one old famous saying in medical world that "Diabetes is the mother of all illnesses." Tuberculosis is one of the commonest of infectious disease acquired by the diabetic population because of immunomodulation and other factors.[8] As the number of type 2 diabetes in incr eased globally there is linear relationship found with Myco-tuberculosis.[9] The incidence found in this study is 12.9% which is a high figure in comparison with non-diabetic population who had 2.6% in 2017 and this supports the study done by Workneh and coworkers in their review article in 2017 who reported diabetic tuberculosis 13% in Pakistan.[10] The increment in our

Table 2: Variants of extra pulmonary TB (N = 18)

S. No	Extra-pulmonary site	Number of patients	Smear +
1	Milliary / Disseminated	02	01
2	Intestinal	11	02
3	Lymph nodes (cervical)	01	Nil
4	Kidneys (renal)	02	Nil
5	Skin	01	Nil
6	Meninges	01	Nil

country has multiple reasons, i.e., increase number of new cases of diabetes, non-adherence to management, poor follow up, self-medication, avoidance in life style, unhygienic living, use of steroids in diabetic asthmatics and habit of spitting in public place.[11] The other predisposing factors found in this study is high rate of addiction and BCG vaccination status. These factors are highly supported by many studies specially one done by Aliya Siddiqui in 2011[12]. Non adherence to therapy and higher HbA_{1c} are important risk factors as supported in the study done in 2013 by Baghoei P and other workers.[13] All the patients in this study were type 2 diabetics while only one patient had type 1 diabetes and one had meningeal tuberculosis with incidental diabetes. Among the TB cases, the pulmonary TB was found to be 53.8% while it was 68% in non-diabetic population, on the other hand extra-pulmonary TB among diabetics was 41.2% in comparison to 33% in non-diabetics. This means that extra-pulmonary TB is more common in diabetics in comparison with non-diabetics where pulmonary TB is more common.[14] The patterns of involvement in pulmonary tuberculosis are almost the same as in non-diabetics, i.e., the apical and upper lobes are more commonly sites of involvement.[15] Intestinal TB is the most favorite site in extra-pulmonary TB followed by renal and disseminated tuberculosis in this study compared to non-diabetics whereas mediastinal, lymph nodes and vertebrae are common sites followed by intestinal, meninges and adrenals.[16] The prevalence of smear positive TB in diabetics was found 56.54% in comparison with non-diabetics where it was found 8-10% in the most of studies.[17] Multidrug resistant TB was found to be 20.5% in this study among diabetics in comparison with non-diabetics it was found 11.3% in most studies.[18] BCG vaccination played an essential role in curtailing TB; in this study 51% were vaccinated and 49% were non-vaccinated because EPI launched its programme after 1971.[19] Those people who were born before this period were obviously non-vaccinated and the contact of disease was more as proofed in many studies.[20] The commonest co-morbidities found in the study were, hypertension, ischemic heart disease, bronchial asthma, chronic obstructive pulmonary disease, nephropathy and neuropathy. All of these are related to uncontrolled diabetes mellitus, duration of disease and sedentary life style and these facts are supported by many studies.[21] Whether these comorbids has influence on the comorbidity of Diabetes and Tuberculosis needs further research.

Table 3: Overall clinical types of tuberculosis among diabetics (N= 39)

S. No	Type of TB	Number of patients	Smear +
1	Primary TB	04 (10.25%)	02
2	Post-primary TB	07 (17.94%)	06
3	Reactivation TB	02 (5.12%)	01
4	Extra-pulmonary TB	16 (41.02%)	03
5	MDR-TB	08 (20.51%)	08
6	Milliary TB	02 (5.12%)	02

Conclusion

The hypothesis derived from this study is according to expectations and therefore is true.

The frequency of tuberculosis in diabetes is much high and extra-pulmonary TB is also high than among non-diabetics. The apical and upper lobes are frequent sites of involvement in the post-primary tuberculosis. Intestinal tuberculosis is commonest site in extra-pulmonary tuberculosis. MDR-TB is very high among diabetics and if extensive measures are not taken now promptly this will become a burning public health issue

in future.

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