TB and Diabetes in Guyana
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ABSTRACT

This study was conducted with the objective of determining the prevalence of diabetes mellitus among TB patients at three tuberculosis clinics in Guyana.

METHODOLOGY: A cross sectional study was conducted among TB patients attending chest clinics in three regions in Guyana. A structured questionnaire was developed to collect demographic, clinical and risk factor data. Random blood sugar testing was done using the OneTouch UltraSmart glucometer (LifeScan, Inc., 2002, Milpitas, CA)..

RESULTS: One hundred TB patients were recruited, 90 had pulmonary TB, and 10 had extrapulmonary disease. Fourteen patients were classified as diabetic (14 %), 12 of whom had a previous diabetic diagnosis made by a physician and 2 had abnormally high random blood sugar. Of the 12 known diabetics, 7 were previously diagnosed, 3 were identified at the time TB was diagnosed and 2 after TB was diagnosed. All diabetics presented with pulmonary TB.

Thirty-one patients were HIV positive (31 %); 28 patients had pulmonary TB (90.3 %) and 3 extrapulmonary TB (9.7 %). None of the diabetics were infected with HIV.

Diabetics were significantly older (median age 44 years) than none diabetics (median age 36.5 years) p-value 0.06 and were more likely to have been incarcerated than non-diabetics (p-value 0.05) and more likely to have an elevated (random) blood sugar level. Clinically, diabetes did not influence the presentation of TB.

CONCLUSION: This study clearly highlighted that diabetes and HIV are frequent in Guyanese TB patients. Routine screening of TB patients for diabetes and diabetics for TB should be speedily implemented. The National TB Programme must work closely with the diabetic clinics so that TB diabetics could be optimally managed.

INTRODUCTION

Guyana is at a point of epidemiological transition with high incidences of infectious diseases such as malaria, tuberculosis and HIV and high burden of chronic diseases such as diabetes and cardiovascular diseases. Many of these conditions overlap geographically and demographically affecting the same subgroups in the population and the same geographic location.

Guyana is one of the high incidence countries for tuberculosis in the Western Hemisphere with an estimated incidence of TB of 185/100 000 population (WHO 2004 Tb country profile for Guyana). In 2005 there were 656 new cases registered at six chest clinics in four regions of Guyana. While Guyana's 2005 TB treatment guidelines has clearly identified diabetes as a risk factor for TB in Guyana, the true relationship between TB and diabetes has never been established among Guyanese TB patients.

While the exact mechanism by which diabetes increases the risk of TB remains largely obscure, diabetes has clearly been established as a risk factor for TB (1, 2, 3, 4, 5).

This study had as its objectives:

a. To determine the prevalence of diabetes among TB patients attending chest clinics in Georgetown, Linden and New Amsterdam.

b. To describe the epidemiology of TB/diabetes co-morbidity and clinical presentation of TB in diabetics.

METHODOLOGY

This study was conducted during the months of May and June 2006 at three of the largest TB clinics located in Georgetown, New Amsterdam and Linden. A cross sectional design was utilized. A detailed questionnaire was developed to collect socio-demographic, clinical and risk factor data for both TB and diabetes. Clinics were visited on clinic days and all TB patients in attendance were eligible for study participation. Patients were informed of the nature of the study and verbal consent solicited prior to patient recruitment. For minors, consent was sought from parents. The study questionnaire was then applied by students and a random blood sugar test done on completion of the interview. Random blood sugar testing was done using the OneTouch UltraSmart glucometer (LifeScan, Inc., 2002, Milpitas, CA). Patients' charts were reviewed to verify particulars and to confirm lab tests. Patients with abnormal random blood sugar readings were referred to the clinic's physician for evaluation.

Diabetics were persons who were either previously diagnosed by a physician or who had an abnormally high random blood sugar (>200mg/dl). TB patients were those with a clinical, radiological or microbiological diagnosis of TB and who were placed on anti-tuberculosis therapy according to national guidelines.

An electronic database was created in EpiInfo version 3.2.2 and the same was used for data analysis. The socio-demographic characteristics of study participants were described in univariate analyses. The frequency of common risk factors and clinical manifestations were examined. Bivariate analyses compared the socio-demographic, risk factor and clinical presentation of TB patients who were diabetics with TB non-diabetics. The chi square test and Student's t-test were used to compare qualitative and numerical variables respectively.

RESULTS

One hundred TB patients were recruited from the 3 TB clinics: 70 from Georgetown, 24 from New Amsterdam and 6 from Linden. Ninety patients had pulmonary TB, and 10 had extrapulmonary disease.

Fourteen patients were classified as diabetic (14 %), 12 of whom had a previous diabetic diagnosis made by a physician and 2 had abnormally high random blood sugar. Of the 12 known diabetics 7 were diagnosed before their TB was discovered, 3 were diagnosed at the time TB was diagnosed and 2 after TB was diagnosed. Seven of the 12 known diabetics were being managed with oral anti-diabetics drugs (type 2 diabetes). All diabetics presented with pulmonary TB.

Thirty-one patients were HIV positive (31 %); none of the diabetics were infected with HIV.

Table 1. Demographic characteristics of TB and TB/diabetes co-morbid patients in Guyana

	All patients (n=100)	TB/DM (n=14)	TB (n=86)
Sex			
Female	44.0	35.7	45.3
Male	56.0	64.3	54.7
Age group			
0-14	6.0	7.1	5.8
15-24	14.0	7.1	15.1
25-34	23.0	7.1	25.6
35-44	28.0	35.7	26.7
45-54	20.0	21.4	19.8
>55	9.0	21.4	7.0
Ethnicity			
African	52.0	35.7	54.7
Indian	32.0	42.9	30.2
Mixed	10.0	7.1	10.5
Amerindian	6.0	14.3	4.7

Table 2. Clinical features of pulmonary TB in diabetics and non-diabetics in Guyana

	All patients (n=90)	TB/DM (n=14)	TB (n=76)
Pulmonary TB	90.0	100	88.4
Cough	82.2	85.7	81.6
Weight loss	80.0	78.6	80.3
Night sweats	72.2	71.4	72.4
Fever	64.4	78.6	61.6
Chest pain	61.1	57.1	61.8
Bloody sputum	36.7	42.9	35.5
Sputum			
Negative	54.4	57.1	53.9
Positive	35.6	28.6	36.8
Unknown	10.0	14.3	9.2

Table 3. Clinical features and risk factors for diabetics and non-diabetics

	All patients (n=90)	TB/DM (n=14)	TB (n=76)
Diabetes symptoms and risk factor			
Polyuria	45.6	57.1	43.4
Excessive thirst	42.2	50.0	40.8
Hunger	5.6	14.3	3.9
Family history of diabetes	44.0	75.0	38.9[1]
Mean random blood sugar	-	243.1	97.8[2]

1 χ2 p-value 0.02, p-value t-test < 0.001

Table 4. Behavioural and other risk factors for TB in Guyanese diabetics and non-diabetics TB patients

	All patients (n=90)	TB/DM (n=14)	TB (n=76)
Previous abnormal CXR	7.0	64.3	55.8
Alcohol use	44.4	50.0	43.5
Unemployment	44.0	35.7	5.3
Exposure to an infectious case	43.0	35.7	44.2
Non-IDU	19.0	7.1	20.9
Imprisonment at time of TB diagnosis	18.0	35.7	15.1[1]
Homelessness	15.0	14.3	15.1
Steroid use	11.0	14.3	10.5

1 p-value 0.06

The median age of the study participants was 38 years (range 68 years) and more than 50 % were males (Table 1). The vast majority of the participants (80%) were of African and East Indian descent. A large proportion of TB patients (44 %) were unemployed and 15 % were homeless. Diabetics were older (median age 44 years, range 55 years) than non-diabetics (median age 36.5 years, range 76 years). Both groups were otherwise similar demographically.

The clinical presentation of pulmonary TB was typical with most patients reporting cough of greater than 2 weeks duration (79 %), weight loss (71 %), night sweats (71 %) and fever (65 %) (Table 2). In this study most patients (55.4 %) were sputum smear negative and in 10 % of the cases there was no record of sputum smear microscopy being done.

We compared the clinical presentation of pulmonary TB among diabetics and TB patients who were not diabetics (Table 2). Diabetes did not significantly impact on the clinical manifestations of TB. Likewise there was no significant distinction of sputum smear microscopy results between diabetics and non-diabetics.

Symptoms suggestive of diabetes were not appreciably different between diabetics and non-diabetics (Table 3). The median blood sugar of diabetics (221 mg/dl, range 583 md/dl) was significantly higher than non-diabetics (96 mg/dl, range 63 years). Diabetics were more likely to have a family history of diabetes (79 %) than non-diabetics (38.9 %, chi-square p-value < 0.001).

TB patients in this study reported high levels of alcohol use (44.4 %), unemployment (44 %), non-injecting drug use (19 %), homelessness (15 %) and imprisonment at the time of their TB diagnosis (18 %) (Table 4). Diabetics (35.7 %) in this study were more likely to have been imprisoned at the time of their TB diagnosis than non-diabetics (15.1 %, chi-square p-value 0.06).

DISCUSSION

In this study of 100 TB patients, 14 % were diabetics. Factors associated with diabetes were median age of 44 years, history of being incarcerated, and a family history of diabetes. TD diabetics were also more likely to present with an elevated random blood sugar tests than non diabetics. Diabetes however had no impact however on the clinical manifestation of pulmonary TB.

The prevalence of diabetes found among the TB patients in Guyana was similar to studies in Japan and Indonesia [5, 6] but lower than that found among Texans and Mexican on the USA/Mexico border (1). Diabetes like AIDS affects Guyanese of the 2 major ethnic groups, East Indian and Guyanese of African descent. In this study we confirm similar reports of age related diabetes prevalence among TB patients (7)

In Guyana the frequency of diabetes is unknown. As such there is no population based data available against which the prevalence of diabetes encountered in this study could be compared. Nevertheless, the high prevalence of diabetes among TB patients clearly points out the need for routine screening of TB patients for this condition. The use of point of care testing for diabetes at TB chest clinics is feasible and should be encouraged. In Guyana TB patients are not routinely screened for diabetes. TB clinicians and nurses should demonstrate a particular high index of suspicion for diabetes especially in patients 40 years and older and those with a family history of diabetes. Given these associations and the influence of diabetes on the progression of latent TB to active TB the case can be made to institute routine screening for TB among diabetics and the provision of preventive therapy to diabetics who have latent TB. Being imprisoned at the time of TB diagnosis was linked to diabetes probably indicating infection acquisition or progression during the period of incarceration.

Two TB patients that participated in this study had abnormally high RBS suggestive of diabetes and were classified as such. These patients were referred for further evaluation to determine whether they were diabetics. Previous studies have demonstrated that a proportion of patients with active tuberculosis have impaired glucose tolerance, which improves or returns to normal levels after receiving effective tuberculosis treatment (4, 6).

All of the TB diabetics presented with pulmonary TB. This study clearly defined the clinical presentation of pulmonary TB in TB diabetics and non-diabetic patients in Guyana. Symptoms such as cough, weight loss, night sweats and fever are frequent among Guyanese. The high frequency of sputum smear negative TB (54.4 %) suggests a strong reliance by clinicians on clinical presentation and radiological evidence to diagnosed pulmonary TB.

Symptoms suggestive of diabetes were not more frequent in diabetics than non-diabetics. The majority of the TB diabetics in this study were receiving treatment for diabetes which may have influence the frequency of diabetes symptoms.

Finally, TB patients in this sample were from the socially deprived sections of the population with a high prevalence of unemployment, homelessness and history of being incarcerated. Likewise lifestyle factors such as alcohol use, cigarette smoking, and illicit drug use were frequent among TB patients. These results correlates to previous reports (3,7) elsewhere. Anecdotal reports suggest that these types of patients are more difficult to manage and less likely to adhere to therapy. It is incumbent on the NTP of Guyana to develop appropriate strategies for getting treatment to this population.

LIMITATIONS

This study was completed as part of the requirements for the University of Guyana's Bachelor or Medicine degree programme (MBBS). Only a limited period of time was allotted to the data collection analysis and report writing as such it was not possible to interview all the patients who were on treatment at the three clinics. Likewise the use of a random blood sugar instead of a fasting sugar may have resulted in a misclassification of two of the patients as diabetics. This study relied of patient's recall of presenting symptoms and may have been affected by recall bias.

CONCLUSIONS/ RECOMMENDATIONS

This study highlighted that diabetes was frequent in TB patients. Consequently routine screening of TB patients for diabetes should be speedily implemented. The use of adequately calibrated glucometers to perform random blood sugar tests at chest clinics is feasible and should be recommended. Likewise routine screening of diabetics for TB should be encouraged and Isoniazid prophylaxis for diabetics latently infected should be considered. The NTP must work closely with the diabetic clinics so that TB diabetics could be optimally managed.

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