

Clinical Presentation, Demographics and Outcomes of Cases of Tuberculosis at Princess Margaret Hospital, Nassau, The Bahamas 2014–2016

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ABSTRACT

Objectives: To determine incidence of cases, demographics, clinical presentation, diagnostic methods and outcomes of cases of tuberculosis (TB) in The Bahamas, 2014–2016.

Methods: A retrospective chart review of cases of TB diagnosed at the Princess Margaret Hospital, Nassau, Bahamas. One hundred eighty-nine cases of active TB were diagnosed between 2014 and 2016, and all cases were evaluated for demographics, risk factors, clinical manifestation, method of diagnosis, symptoms and treatment outcomes.

Results: Of the 189 cases of notified TB between 2014 and 2016, 46 were reported in 2014, 60 in 2015 and 83 in 2016. The mean age was 37.96 (\pm 18.20) years old. One hundred sixty-four (86.8%) presented with symptoms, 19 (10.1%) were diagnosed by routine screening and 6 (3.2%) cases were diagnosed by contact tracing. One hundred nine (59.9%) were human immunodeficiency virus (HIV) negative and 73 (40.1%) were HIV positive. One hundred forty-four (76.2%) presented with cough, 84 (44.7%) weight loss, 80 (42.3%) fever, 44 (23.3%) night sweats, 43 (22.8%) chills, 32 (16.9%) fatigue and 25 (13.2%) haemoptysis. One hundred twenty-six (66.7%) completed the full course of antibiotic therapy, 29 (15.3%) patients expired before completing treatment and 18 (9.5%) of patients defaulted.

Conclusion: Human immunodeficiency virus is a major risk factor for TB in The Bahamas, and it is advised that all patients diagnosed with TB be tested for HIV. We also advise screening HIV positive patients for TB. Screening other high-risk groups such as migrant populations would also reduce the amount of latent TB cases, which may progress to active TB.

Keywords: Clinical presentation, The Bahamas, treatment outcome, tuberculosis.

INTRODUCTION

Tuberculosis (TB) is one of the oldest diseases known to man, yet the World Health Organization reports that TB is one of the top 10 causes of death worldwide (1). Despite research efforts and numerous initiatives to control the disease worldwide, TB has resulted in the death of 1.8 million people and 10.4 million new cases in 2015 (1). The Bahamas which is considered a country of intermediate burden for TB has not been exempted from this public health issue. According to the World Bank, the incidence of TB in The Bahamas for 2015 was 18 per 100 000 persons and over the past 10 years has fluctuated from 21 per 100 000 in 2006 to 9.9 per 100 000 in 2012 (2). Various factors have made the eradication of TB in The Bahamas

difficult, such as high rates of human immunodeficiency virus (HIV) infection and immigration from countries with high TB prevalence. In understanding the epidemiology and risk factors of TB cases in The Bahamas, the development of protocols can improve screening procedures and decrease disease burden.

METHODS

This study was a retrospective chart review conducted at the Princess Margaret Hospital (PMH), Nassau, Bahamas. Ethical approval was given by the local ethics committee. Data was collected from the patients' medical records in the medical records department as well as the admissions log book at the PMH Chest Clinic. Here,

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189 cases of active TB were diagnosed at PMH between 2014 and 2016, and all cases were evaluated. Cases of TB are defined as patients who presented with clinical and/or radiologic signs suggestive of TB for whom the clinical decision was made to treat with standard anti-TB therapy regardless of *Mycobacterium tuberculosis* culture positivity.

Variables extracted for analysis included age, gender, year of diagnosis, nationality, HIV status (including CD4, viral load and medication history of HIV positive patients), street address (for global positioning system (GPS) mapping), risk factors (diabetes mellitus (DM), cigarette smoking, alcohol (ETOH) use, history of travel to an endemic area, contact with TB patients or other ill patients with respiratory symptoms), clinical manifestation, method of diagnosis, symptoms, radiologic findings and tuberculin skin test results.

Data was inputted into a spreadsheet and imported into a current version of the IBM SPSS Statistics application software (Chicago, IL, USA) for descriptive and inferential data analysis.

RESULTS

There were 201 cases of TB reported in The Bahamas between 2014 and 2016, and 189 of these cases were reported at the PMH, Nassau, Bahamas. Eleven other cases were reported at Doctors Hospital, Nassau, Bahamas and RAND Memorial Hospital Freeport, Bahamas. Of note, 46 cases were reported in 2014, then 60 in 2015 and 83 in 2016. Incidence per 100 000 for these years was 12.5, 16.1 and 22.0 cases per 100 000, respectively.

Demographics and risk factors are summarized in Table 1.

Table 1: Socio-demographic profile and risk factors of study's participants

Parameter	n (%)	Parameter	n (%)
Age (years)		Gender	
<20	33 (17.5)	Male	106 (56.1)
20–40	65 (34.4)	Female	83 (43.9)
40–60	70 (37.0)	HIV	
>60	21 (11.1)	Status known	182
Mean (SD)	37.96 (± 18.20)	HIV negative	109 (59.9)
Nationality		HIV Positive	73 (40.1)
Bahamian	115 (60.8)	Status not known	7
Foreign born	74 (39.2)	Diabetes mellitus	18 (9.7)
Haitian	67 (35.4)	Cigarette smoker	35 (18.5)
Jamaican	5 (2.6)	ETOH use	24 (12.7)
Other	2 (1.1)	Travel to endemic area	14 (7.4)
		Ill/TB contact	24 (12.7)

HIV = human immunodeficiency virus; TB = tuberculosis; ETOH = ethyl alcohol; SD = standard deviation.

Method of diagnosis

Of the 189 cases in this study, 164 (86.8%) presented with symptoms, 19 (10.1%) were diagnosed by routine screening and 6 (3.2%) by contact tracing.

Clinical presentation

In this study, 182 (96.3%) had pulmonary TB and 7 (3.7%) patients had extra-pulmonary manifestations of TB: four TB lymphadenitis, two TB meningitis and one disseminated TB. Clinical presentation ranged from six symptoms to none of the typical symptoms for TB. Table 2 summarizes the frequency of symptoms as well as the number of presenting symptoms of patients. The median number of symptoms was 2 (interquartile range: 1, 4).

Table 2: Frequency and number of symptoms in the study's participants

Symptom	n (%)	Number of symptoms	n (%)
Cough	144 (76.2)	0	30 (15.9)
Weight loss	84 (44.7)	1	28 (14.8)
Fever	80 (43.3)	2	49 (25.9)
Night sweats	44 (23.3)	3	33 (17.5)
Chills	43 (22.8)	4	21 (11.1)
Fatigue	32 (16.9)	5	25 (13.2)
Haemoptysis	25 (13.2)	6	3 (1.6)

Treatment outcomes

Of the 189 cases studied, 126 (66.7%) completed the full course of antibiotic therapy for TB. In total, 29 (15.3%) patients expired before completing treatment, 18 (9.5%) defaulted from treatment, 4 (2.1%) were reported to have returned to their home country before completing treatment and 1 (0.5%) was still receiving antibiotic therapy due to multidrug resistant TB. Treatment outcome was not found for 11 (5.8%) patients.

Global positioning system mapping of cases

Coordinates of cases from New Providence were plotted on Google map using GPS visualizer website and are seen in the figure.

DISCUSSION

There were 106 (56.1%) males and 83 (43.9%) females in this study. Other studies reviewed also demonstrated a male predominance ranging from 53.8% to 77.3% (3–10). In these studies, it was suggested that males may have a higher rate of TB infection due to increased prevalence of risk factors such as smoking and HIV co-infection. This study showed that it was statistically significant



Figure: GPS mapping of cases of TB 2011-2016 in New Providence, The Bahamas. GPS = global positioning system; TB = tuberculosis.

that males were more likely to have a history of cigarette smoking ($p < 0.001$), ETOH abuse ($p < 0.001$) and night sweats ($p = 0.028$).

The mean age of the 189 cases was $37.96 (\pm 18.20)$ years old. One hundred thirty-five (71.4%) of the patients in this study were in the young and middle-age-groups (20–59). There were fewer cases seen in the < 20 and > 60 population. Here, 33 (17.5%) cases were < 20 years, and 21 (11.1%) cases were ≥ 60 years of age. In this study, some known risk factors that likely contribute to this include HIV positivity, having DM, having an ill TB contact and a history of consuming > 40 g of ETOH per day with the mean ages being $42.64 (\pm 1.67)$, $51.44 (\pm 2.70)$, $28.50 (\pm 4.47)$ and $45.13 (\pm 3.02)$ years, respectively. With respect to nationality, it was shown that 115 (60.8%) patients were Bahamian and 74 (39.2%) were foreign born with the majority of the foreign-born patients being from Haiti. Immigrant populations have been regarded as potential carriers of diseases depending on the prevalence of the disease within the country of origin. In some countries such as Switzerland and United States, it was reported that the majority of patients reported to have TB were foreign born being 74% (9) and 51.2% (11), respectively. On the other hand, in other report which evaluated 58 008 cases of TB in the European union showed that in 2014, 27% of cases of TB were from patients of foreign origin which was a 7% increase from 2005 (12).

In this study, 18 (9.7%) patients were documented to be diabetic. Diabetes mellitus is considered a risk factor for TB due to its suppressive effects on the immune

system (13). A population-based study in the United Kingdom found DM to be an independent risk factor for TB with the prevalence of 16.5 in diabetics and 13.5 in non-diabetics per 100 000. In a study by Magee *et al*, the prevalence of DM was 11.6% (of 318 patients) (7).

In this study, HIV status for 182 (96.3%) of patients was documented. This was a significant number considering that in other studies that were reviewed, the HIV testing rate for patients with TB ranged from 38.1%–87.1% (5, 14–16). Seventy-three (40.1%) of the 182 patients tested in this study were HIV positive. Numerous studies assessed TB-HIV coinfection rates, and these percentages varied. Gao *et al* did a systematic review and meta-analysis of ‘Prevalence of TB/HIV Co-Infection in Countries Except China’. They evaluated 46 studies with a combined population of 272 466. The estimated prevalence of TB/HIV co-infection ranged from 2.93% to 72.34% (17).

In this study, the most common symptom was cough (76.2%), followed by weight loss (44.7%), fever (42.3%), night sweats (23.3%), chills (22.6%), fatigue (16.9%) and haemoptysis (13.2%). It was noted that most patients presented with three signs/symptoms (25.9%) and 30 (15.9%) of the cases did not present with any of the classic signs/symptoms of TB. In various studies that were reviewed, cough was the most common complaint ranging from 46.7% to 100% (8, 10, 18). In other studies, the frequency of other symptoms were varied, in one study of 372 patients night sweats was seen in 127 (34.1%) and fever was seen in 123 (33%) (10). In another study by Rathman *et al* of 340 patients’ frequency of

symptoms reported included cough (100%), weight loss (97.4%), fever (94.4%), night sweats (77.9%) and haemoptysis (35.9%) (8).

In this study, of the 189 cases, 66.7% completed the full course of treatment, 15.3% expired before completing treatment and 9.5% of patients defaulted. It should be noted that for expired patients it was not specified whether the cause of death was due to TB or other causes. Faustini, Hall and Perucci conducted a systematic review of TB cases in Europe to assess outcomes. They reported that of 26 studies reviews 74.4% of cases had a successful outcome, 12.3% of cases had an unsuccessful outcome (treatment failure, defaulters, lost to follow up, transferred-out) and 6.8% of patients died (19). Antoine and Che evaluated outcomes for TB cases in France for 2009. Outcomes were available for 2316 out of 3667 cases; they reported successful treatment for 70% of cases. Of the remaining 30% who did not complete treatment 32% died, 32% were lost to follow-up, 17% transferred out, 14% were still receiving treatment and 5% had treatment stopped prior to completion (20).

CONCLUSION

This study shows that HIV remains a major risk factor for TB in The Bahamas, and it is advised that all patients suspected or diagnosed with TB be tested for HIV as well as screening HIV positive patients for TB. In addition, screening other groups such as migrant populations would also be of benefit to reduce the amount of latent TB cases, which may progress to active TB.

AUTHOR CONTRIBUTIONS

JH McIntosh conceived paper, collected data, conducted data analysis and interpretation, wrote manuscript and approved final version. KM Moss provided oversight to study, participated in study design, data interpretation and revision of manuscript and approved final version. NM Forbes participated in study design, data interpretation and revision of manuscript and approved final version. MA Frankson participated in study design, data analysis and interpretation, critically revised manuscript and approved final version. The authors declare that they have no conflicts of interest.

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REFERENCES

1. Tuberculosis [Internet]. World Health Organization. [cited 2017Mar30]. Available from: <http://www.who.int/immunization/diseases/tuberculosis/en/>
2. Incidence of tuberculosis (per 100 000 people), The Bahamas [Internet]. The World Bank. World Health Organization, Global Tuberculosis Report; [cited 2017Mar30]. Available from: <https://data.worldbank.org/indicator/SH.TBS.INCD?locations=BS>
3. Yassin MA, Takele L, Gebresenbet S, Girma E, Lera M, Lendebo E et al. HIV and tuberculosis coinfection in the Southern Region of Ethiopia: a prospective epidemiological study. *Scand J Infect Dis Suppl.* 2004; **36**: 670–3.
4. Smiljic S, Radovic B. Clinical and radiographic characteristics of pulmonary tuberculosis. *Medical review Medicinski pregled.* 2012; **65**: 196–9.
5. Carvalho LGM, Buani AZ, Zöllner MSAC, Scherma AP. Co-infection with mycobacterium tuberculosis and human immunodeficiency virus: an epidemiological analysis in the City of Taubaté, Brazil. *J Bras Pneumol.* 2006; **32**: 424–9.
6. Gegia M, Magee MJ, Kempker RR, Kalandadze I, Chakhaia T, Golub JE et al. Tobacco smoking and tuberculosis treatment outcomes: a prospective cohort study in Georgia. *Bull World Health Organ* 2015; **93**: 390–9.
7. Magee MJ, Kempker RR, Kipiani M, Gandhi NR, Darchia L, Tukvadze N et al. Diabetes mellitus is associated with cavities, smear grade, and multidrug-resistant tuberculosis in Georgia. *Int J Tuberc Lung Dis* 2015; **19**: 685–92.
8. Rathman R, Sillah J, Hill PC, Murray, JF, Adegbola R, Corrah T et al. Clinical and radiological presentation of 340 adults with smear-positive tuberculosis in The Gambia. *Int J Tuberc Lung Dis* 2003; **7**: 942–7.
9. Svensson E, Millett J, Lindqvist A, Olsson M, Ridell M, Rastogi N. Impact of immigration on tuberculosis epidemiology in a low-incidence country. *Clin Microbiol Infect* 2010; **17**: 881–7.
10. Guler SA, Bozkus F, Inci MF, Kokoglu OF, Ucmak H, Ozden S et al. Evaluation of pulmonary and extrapulmonary tuberculosis in immunocompetent adults: a retrospective case series analysis. *Med Princ Pract* 2014; **24**: 75–9.
11. Overview of Tuberculosis Epidemiology in the United States. In: Core curriculum on tuberculosis: what the clinician should know. 6th ed. Centers for Disease Control and Prevention; 2013. p. 1–18.
12. Van der Werf MJ, Zellweger JP. Impact of migration on tuberculosis epidemiology and control in the EU/EEA. *Euro Surveill* 2016; **21**: pii30174.
13. Dooley KE, Chaisson RE. Tuberculosis and diabetes mellitus: convergence of two epidemics. *Lancet Infect Dis* 2009; **9**: 737–46.
14. Post JJ, Goldberg H, Kaufman G, Plit M, Ressler K-A, Ferson MJ. HIV testing rates and co-infection among patients with tuberculosis in south-eastern Sydney, 2008–2013. *Med J Aust.* 2015 Mar 16; **202**: 255–6.
15. Rivest P, Sinyavskaya L, Brassard P. Burden of HIV and tuberculosis coinfection in Montreal, Quebec. *Can J Public Health.* 2014; **105**: 263–7.
16. Rodwell TC, Barnes RFW, Moore M, Strathdee SA, Raich A, Moser KS et al. HIV–tuberculosis coinfection in Southern California: evaluating disparities in disease burden. *Am J Public Health.* 2010 Sep 1; **100**: 178–85.
17. Gao J, Zheng P, Fu H. Prevalence of TB/HIV co-infection in countries except China: A systematic review and meta-analysis. *PLoS One.* 2013 May 31; **8**: e64915.
18. Rizvi N, Shah RH, Inayat N, Hussain N. Differences in clinical presentation of pulmonary tuberculosis in association with Age. *J Pak Med Assoc.* 2003 Aug; **53**: 321–4.
19. Faustini A, Hall AJ, Perucci CA. Tuberculosis treatment outcomes in Europe: a systematic review. *Eur Respir J.* 2005; **26**: 503–10.
20. Antoine D. Treatment outcome monitoring of pulmonary tuberculosis cases notified in France in 2009. *Euro Surveill* 2013 Mar 21; **18**: 20434.

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