

# TB and Diabetes Mellitus: Case presentation from the field

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# TB and Diabetes Mellitus 2-3-4-5-Dogma

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People with DM and TB have:

- ❑ **2x** greater risk of remaining culture positive
- ❑ **3x** greater risk of progression to TB disease
- ❑ **4x** greater risk of relapse after standard treatment
- ❑ **5x** greater risk of death during TB treatment

# TB and DM Programmatic Management Experience from Georgia

The National TB management standard includes screening of all TB patients for DM

❑ When the screening is conducted?

❑ At TB diagnosis/registration - it is the easiest time to screen, BUT May obtain false-positive diagnosis of DM due to stress-induced hyperglycaemia

❑ How screening is conducted?

❑ Clinical assessment/patient interview - Very low sensitivity and too much overlap with clinical presentation of TB

❑ Random Plasma Glucose - Easy to perform, but sensitivity is low—needs fasting blood glucose or HbA1 for confirmation if elevated

# TB and DM Programmatic Management Experience from Georgia (2)

- ❑ Very close and good collaboration between TB program and endocrinologists and Georgia Diabetes Association
- ❑ In 2018, within the Global Fund TB project 100% of endocrinologists of Georgia were trained on TB, LTBI and DM aspects - how the two diseases are associated and what interventions are necessary to be in place
- ❑ National Center for TB and Lung Diseases has a full time endocrinologist/diabetologist who is involved in diagnosis and prospective management of TB and DM patients in collaboration with the pulmonologists
- ❑ Other specialists such as a neurologist and ophthalmologist are also contracted as consultants within the national TB program
- ❑ Podiatrists and nephrologists consultations will be also accessible free of charge for the TB/DM patients under recently started teleclinic program

# TB and DM Research Questions and Answers from Georgia

- ❑ In collaboration with the international partners/universities the issue of TB and Diabetes have been investigated over the past decade in Georgia aiming at evaluating the following research questions:
  - ❑ Is diabetes a predictor for MDR-TB?
  - ❑ Is there a relationship between DM and primary MDR-TB Treatment outcomes and time to culture conversion?
  - ❑ Is the DM a risk factor for poor treatment outcomes of MDR-TB patients, as it is a recognized predictor of poor outcomes of 1<sup>st</sup> line TB Treatment?

# Research Publications from Georgia (1)

OPEN ACCESS Freely available online



## Diabetes Mellitus, Smoking Status, and Rate of Sputum Culture Conversion in Patients with Multidrug-Resistant Tuberculosis: A Cohort Study from the Country of Georgia

Matthew J. Magee<sup>1,2\*</sup>, Russell R. Kempker<sup>3</sup>, Maia Kipiani<sup>4</sup>, Nestani Tukvadze<sup>4</sup>, Penelope P. Howard<sup>1,2</sup>, K. M. Venkat Narayan<sup>1,2</sup>, Henry M. Blumberg<sup>1,2,3</sup>

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**CONCLUSION:**  
In adjusted analyses, DM did not impact culture conversion rates in a clinically meaningful way

### FINDINGS (N=1852, 2009-2012 cohorts):

- Prevalence of DM among MDR-TB patients in Georgia 86/1852 (4.6%);
- The rate of conversion similar among patients with MDR-TB and DM (aHR 0.95, 95%CI 0.71–1.28) compared to patients with MDR-TB only;
- The cumulative risk of poor treatment outcome was also similar among TB patients with and without DM (aRR 1.03, 95%CI 0.93–1.14).

# Research Publications from Georgia (2)

Open Forum Infectious Diseases

MAJOR ARTICLE



## Diabetes Reduces the Rate of Sputum Culture Conversion in Patients With Newly Diagnosed Multidrug-Resistant Tuberculosis

Argita D. Salindri,<sup>1</sup> Maia Kipiani,<sup>2</sup> Russell R. Kempker,<sup>3</sup> Neel R. Gandhi,<sup>3,4</sup> Lasha Darchia,<sup>2</sup> Nestani Tukvadze,<sup>2</sup> Henry M. Blumberg,<sup>3,4</sup> and Matthew J. Magee<sup>1,4</sup>

### CONCLUSION:

DM was associated with an increased risk of primary MDR TB and with a longer time to sputum culture conversion.

### FINDINGS (N=318, 2011-2014 cohorts):

- Prevalence of DM among MDR-TB patients in this study 36/318 (11.3%);
- In multivariable analyses, diabetes (aOR, 2.51; 95% confidence interval [CI], 1.00–6.31) and lower socioeconomic status (aOR, 3.51; 95% CI, 1.56–8.20) were associated with primary MDR TB
- Among patients with primary MDR TB, 44 (84.6%) converted sputum cultures to negative. The rate of sputum culture conversion was lower among patients with diabetes (adjusted hazard ratio [aHR], 0.34; 95% CI, .13–.87)

# TB and DM Case Presentation

- ❑ A 42 years old male diagnosed for TB in July 2020
- ❑ At diagnosis – New, previously never treated, AFB+, Xpert MTB+, RR-TB
- ❑ 1<sup>st</sup> line Phenotypic DST - H,R,Z,E – Resistant
- ❑ HainMTBDRsl – Fluoroquinolones-R, Kanamycin – R, Capreomycin – S
- ❑ X-ray – Right upper lobe Infiltration, focal shadows bilaterally in lower lobes. Cor - norm

## Baseline tests:

- ❑ CBC: HB-126 g/l, RBC - $4.8 \times 10^{12}/L$ , PLT- $386 \times 10^9/L$ , WBC- $7.0 \times 10^9/L$ , ESR – 40mm/hr
- ❑ Biochemistry: ALT-7U/L, AST-8U/L, Bilirubin-16 mcmol/L, Creat-80 mcmol/L, K-5.6 mmol/L, Albumin -42 g/L, Lipase – 48 U/L, anti-HCV(-), HBsAG(-), **Fasting glucose 1 – 23,3 mmol/L, FBG2- 17 mmol/L, postprandial glucose-19 mmol/L, HbA1C -12%, TSH-5.5 ml U/L, FT4-1.03 ng/dl**



# TB and DM Case Presentation (cont'd)

- ❑ ECG – QTcF interval 415 msec
- ❑ Before treatment initiation patient received clinical consultations of cardiologist, endocrinologist, ophthalmologist, neurologist and otorhinolaryngologist;
- ❑ Patient was diagnosed: New pulmonary XDR-TB, newly detected diabetes mellitus, hypothyroidism (indeterminate), bilateral neurosensory deafness of grade 4 severity
- ❑ **On 16.07.2020** patient was started on fully oral longer regimen with a central consilium decision
- ❑ Treatment regimen for XDR-TB: 18-20 Bdq-Dlm-Lzd-Cfz-Cs (+pyridoxine)
- ❑ Prescribed Tx for DM: Metformin 500 mg twice/day, Insulin Adipra 6 units at 9am, 2pm and 6pm before meals, and Insulin Lantus 15 units at 11pm
- ❑ Tx for hypothyroidism: Euthyroxine 50mcg before breakfast.

# TB and DM Case Presentation (cont'd)

## On 18.08.20 (end of month 1):

- ❑ Patient - AFB(-)
- ❑ CBC: HB-118 g/l, RBC - $4.5 \times 10^{12}/L$ , PLT- $414 \times 10^9/L$ , WBC- $9.3 \times 10^9/L$ , ESR – 40mm/hr
- ❑ Biochemistry: ALT-8U/L, AST-6U/L, Bilirubin-8 mcmol/L, Creat-45 mcmol/L, K-3.6 mmol/L, Albumin -39 g/L
- ❑ Fasting glucose – 4.8 mmol/L, postprandial glucose-6.2 mmol/L, HbA1C - 12%, TSH-1.3 ml U/L, FT4-0.9 ng/dl
- ❑ Patient discharged to outpatient regional TB facility and is managed by the TB doctor and is regularly supervised by endocrinologist.



**THANK YOU!**