TB and Diabetes in China

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Jan 16th, 2013
Epidemiology of TB and Diabetes in China

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<td>• 92.4 million adults with diabetes</td>
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<td>• 148.2 million adults with pre-diabetes</td>
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<td>• prevalence of active PTB 459/100 000</td>
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<td>• prevalence of bacteriological positive PTB 66/100 000</td>
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<td>(Report on fifth national epidemiological sampling survey of tuberculosis, 2010)</td>
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Collaborative Framework for Care and Control of Tuberculosis and Diabetes
Screening of patients with tuberculosis for diabetes mellitus in China

- 6 facilities
- 8886 registered patients with TB
- 1090 (12.4%) patients with DM were identified
- 227 (2.7%) patients with a newly diagnosed of DM

Li L, et al. Screening of patients with tuberculosis for diabetes mellitus in China. Tropical Medicine and International Health. 2012, 17, 1294-1301
Screening patients with Diabetes Mellitus for Tuberculosis in China

- 5 facilities
- 11330 registered patients with DM
- 92 with a positive TB symptom
- 7 patients with known TB
- 48 patients with newly diagnosed TB

Proportion of drug-resistance TB and Diabetes in the 1st Department of Tuberculosis, Beijing Chest Hospital. (from Oct 2010 to Sep 2012)
Clinical Features of TB and Diabetes Patients (1)

- **Symptoms and signs**
  
  Some study showed TB with diabetes patients had more symptoms than TB with non-diabetes patients, including cough, hemoptysis, dyspnea, fever, night sweats and weight loss.

*Alisjahbana B, et al. The Effect of Type 2 Diabetes Mellitus on the Presentation and Treatment Response of Pulmonary Tuberculosis. Clinical Infectious Diseases 2007, 45, 428–35*
Investigation

Some study showed that sputum smear positivity is more frequent in diabetes than in non-diabetes.
Clinical Features of TB and Diabetes Patients (2)

Investigation

Aalisjahbana B, et al. The Effect of Type 2 Diabetes Mellitus on the Presentation and Treatment Response of Pulmonary Tuberculosis. Clinical Infectious Diseases 2007, 45, 428–435
Clinical Features of TB and Diabetes Patients (2)

Radiological images

a preponderance of cavitary and lower-zone disease
Clinical Features of TB and Diabetes Patients (2)

- Radiological images
  - a decreased frequency of upper (17% vs. 56%)
  - an increased frequency of lower (19% vs. 7%)
  - More cavitations (82% vs. 59%) often in the lower lung fields (29% vs. 3%)
  - More multiple cavities (25% vs. 2%)

TB and Diabetes Treatment

Treatment of Diabetes

- Oral hypoglycaemic agents or Insulin injections. The latter is frequently recommended.

- Goals of glycaemic control.
  - A1C <7.0%
  - Preprandial capillary plasma glucose 70–130 mg/dl (3.9–7.2 mmol/l)
  - Peak postprandial capillary plasma glucose <180 mg/dl (<10.0 mmol/l)
Treatment of TB (1)

- New patients:
  2HRZE/4HR

- Previously treated patients (low likelihood of drug resistance)
  2SHRZE/1HRZE/5HRE

*Guideline of TB treatment and diagnosis, Chinese Medical Association on TB, 2000*
Treatment of TB (2)

- Resistance to Isoniazid:
  \[3RZSE\pm Ofx(Lfx)/6RZE\pm Ofx(Lfx)\]

- Resistance to Rifampicin:
  \[3HZSE\pm Ofx(Lfx)/9EHZ\pm Ofx(Lfx)\]

- Resistance to Isoniazid and another drug*:
  \[3ROfx(Lfx)Am(Km)E\pm Z/9ROfx(Lfx)E\pm Z\]

- Resistance to Rifampicin and another drug*:
  \[3HOfx(Lfx)Am(Km)E\pm Z/9HOfx(Lfx)E\pm Z\]

- Resistance to three drug*:
  \[6R(H)Ofx(Lfx)Am(Km)Z\pm P/12R(H)Ofx(Lfx)Z\pm P\]

- MDR-TB:
  \[Am(Km,Cm)Ofx(Lfx)P(Cs)ZPto(E)/18Ofx(Lfx)P(Cs)ZPto(E)\]

*: not including MDR-TB

Guideline of DR-TB Chemotherapy, China Anti-TB Association, 2009
What does TB and Diabetes mean for a TB clinician? (1)

- Altered pharmacokinetics

**Figure 1.** Mean plasma concentration (mg/L) over time (h) of rifampicin in 17 patients with tuberculosis (TB; open circles) and 17 patients with TB and with type 2 diabetes (DM; closed squares), with standard deviations. $P$ value of comparison between groups <.05.

**Figure 2.** Natural logarithm of the area under the curve (AUC$_{0.6}$h) of rifampicin versus body weight (kg) for patients with tuberculosis (TB; dashed line) and for patients with TB and with type 2 diabetes (DM; solid line).

*Nijland HJM, et al. Exposure to Rifampicin is Strongly Reduced in Patients with Tuberculosis and Type 2 Diabetes. Clinical Infectious Diseases 2006; 43:848–54*
What does TB and Diabetes mean for a TB clinician? (1)

- Exposures to rifapicin was reduced by as much as 53% in patients with diabetes, compared with non–diabetic controls.

- The maximal plasma concentration of rifampicin was above the target concentration of 8mg/L in 1 of 17 patients with TB who had DM, compared with 8 of 17 patients who did not have DM.

- These pharmacokinetic differences might lead to easier acquisition of drug resistance and might explain the lower bacteriological response in diabetic patients with TB.

Nijland HMJ, et al. Exposure to Rifampicin Is Strongly Reduced in Patients with Tuberculosis and Type 2 Diabetes. Clinical Infectious Diseases 2006; 43:848–54
What does TB and Diabetes mean for a TB clinician? (2)

- delays in sputum conversion

  Although bacillary burden might be higher at presentation in diabetic patients, leading to modestly longer times to sputum-culture conversion, rates of sputum-culture conversion are similar to those of non-diabetic patients by 2-3 months of treatment.

  Whether increased time to culture conversion in diabetic patients leads to higher risk of relapse has not been adequately studies.

What does TB and Diabetes mean for a TB clinician? (3)

- a higher relapse rate and increased risk of death
  - **Egypt** diabetes conferred a 3.9 times increased risk of treatment failure in patients.
  - **Indonesia** 6-month sputum cultures were positive in 22.2% of patients with diabetes mellitus and in 6.9% of controls.
  - **USA** Patients with pulmonary tuberculosis in Maryland have shown a 6.5–6.7 times increased risk of death in diabetic patients compared to nondiabetic.

- **Alisjahbana B, et al.** *The Effect of Type 2 Diabetes Mellitus on the Presentation and Treatment Response of Pulmonary Tuberculosis*. Clinical Infectious Diseases 2007,45,428–35
Thanks for Your Attention!