Shvets O.M., Stepanenko H.L.

Possible mechanism of insulin resistance development during the treatment of tuberculosis

Kharkiv National Medical University, Kharkiv, Ukraine

Introduction. There is an opinion that TB can lead to glucose metabolism disorders, such as hyperglycemia and insulin resistance (IR) and contribute to new onset of DM. In most cases the association between hyperglycemia and TB disappears after tuberculosis treatment. However, a recent study reported on the development of IR in TB patients who received anti-tuberculosis treatment (ATT) and initially were not insulin resistant, which is contests the stress hyperglycemia hypothesis, as well as the improvement of an inflammatory state.

Aim: to find out possible mechanism of insulin resistance development in pulmonary tuberculosis patients during the antituberculosis therapy.

Materials and methods. Study was performed on 56 patients aged 18 - 55 years (44 men (78.5%) and 12 women (21.5%)) with new cases of pulmonary TB. We excluded those subjects, who had initial insulin resistance, drug-resistant TB, body mass index over 25 kg/m^2 and comorbid diseases (HIV/AIDS, DM, liver diseases, cancer diseases, and alcohol consumption). Standard four-component treatment scheme was prescribed. We performed an oral glucose tolerance test (OGTT) and measured fasting plasma insulin level at the beginning of the treatment and in the end of intensive phase. Group I (n=36) included patients whose HOMA-IR index was below 2.7 (patients did not develop IR); Group II (n=20) included patients whose HOMA-IR index was higher than 2.7 (patients developed IR).

Results. Males prevailed in both groups: group I - 26 (72.2%), group II -17 (85%). There was no significant difference in age between groups. Among subjects who developed IR during the ATT, the median BMI was 19.59. Three patients (15%) had fibrous cavernous pulmonary TB and the rest – had infiltrative TB. On the X-ray, one-side pathologic changes prevailed - 12 (60%). Massive mycobacteria excretion had 10 (50%) patients. In the group of patients, who developed IR during the treatment initial median fasting plasma glucose level was 3.5 mmol/L. After 30 days of ATT, we observed increase of median fasting plasma glucose level to 4.39 mmol/L ($p>0.05$). We found significant increase of median postprandial plasma glucose level during the treatment of pulmonary tuberculosis patients (3.33 mmol/L vs 5.24 mmol/L). Baseline median fasting plasma insulin level increased from 8.2 mcU/ml to 16.33 mcU/ml ($p<0.05$) and HOMA-IR rised from 1.5 to 4.94. We found statistically significant changes, such as an increase in total cholesterol level (4.02 vs 5.06 mmol/L), LDL-level (2.58 vs 3.21) and atherogenic index (2.78 vs 3.31). During the treatment, we revealed that the median level of AlAT in the group of IR-patients increased in 2 times – 42 IU/L ($p<0.05$). We explain these changes by hepatotoxicity of the first-line antituberculosis drugs.

Conclusions. 1.Newly-diagnosed patients with drug-susceptible pulmonary tuberculosis who developed insulin resistance during the antituberculosis therapy have expressed metabolic changes, in the form of impaired carbohydrate and lipid metabolism. 2. The pathogenetic basis of these changes may be an impairment of liver function, due to the influence of first-line antituberculosis drugs.