The Pancreatic Beta Cells Functional Status and The Relationship with Iron Overload in Patients with β-thalassemia Major

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- **Objective:**

To investigate the functional status and influencing factors of pancreatic beta cells in patients with β-thalassemia major(β-TM).

- **Methods:**

A cross-sectional study was conducted in 88 patients with β-TM, with an average age of 12.27 ± 4.75 years (50 males and 38 females). Thirty-two healthy subjects were enrolled as the control group, without statistical differences in age, sex, BMI. FPG and FINS comparing with the patient group. The insulin resistance index (HOMA-IRI), Insulin sensitivity index (HMOA-ISI) and beta cells function index (HOMA-β FI) were calculated between the two groups. HbA1c, fructosamine, serum ferritin (SF) and glycosylated albumin were detected in patients with β-TM, and oral glucose tolerance test, insulin release test, cardiac and liver magnetic resonance T2* were performed. Two independent samples were compared by t-test or rank sum test. Univariate test was performed to analyze the risk factors of abnormal glucose metabolism in patients with thalassemia major.

- **Results:**

1. Compared with the control group, FPG, FINS and HOMA-IRI increased significantly in the β-TM patients, whereas the HOMA-ISI and HOMA- FI decreased, but the differences of HOMA- FI were not statistically significant.
2. Among the 88 patients with β-TM, 13 (14.77%) patients had been diagnosed with diabetes, 27 (30.68%) patients had abnormal glucose tolerance, including 26 (29.55%) with impaired fasting glucose and 7 (7.95%) with impaired glucose tolerance.
3. Patients with β-TM were divided into diabetes group, abnormal glucose tolerance group and normal OGTT group. The fructosamine (49 cases), glycosylated hemoglobin (54 cases) and glycosylated albumin (37 cases) levels were conducted. All the three indicators were elevated with the aggravation of abnormal glucose metabolism.
4. Patients with β-TM were divided into the abnormal OGTT group and the normal OGTT group. Absence of insulin secretion peak, as well as insulin secretion peak delay, was identified in both groups. In the abnormal OGTT group, HOMA-IRI increased, HOMA-ISI and HOMA-β FI decreased with statistical differences.
5. Age, serum ferritin and cardiac T2* had statistically significant differences between the abnormal OGTT group and the normal OGTT group. There were statistically significant differences in the incidence of abnormal OGTT between serum ferritin and cardiac iron deposition

- **Conclusion:**

1. Among the patients with β-TM, the morbidity of diabetes was 14.77%, and the morbidity of abnormal glucose metabolism was 30.68%.
2. HbA1c can be used as an indicator to evaluate the average blood glucose level of patients with β-TM.
3. Patients with β-TM showed abnormal insulin secretion, decreased HOMA-ISI and HOMA-β FI, which stand for impaired insulin secretion and dysfunction of pancreatic beta cells.
4. Age, serum ferritin, hepatic iron deposition and cardiac iron deposition are related to abnormal glucose metabolism in patients with β-TM. Patients with cardiac iron deposition or SF > 4000μg/L are more prone to abnormal glucose metabolism, and glucose metabolism indicators should be actively and closely monitored and iron eradication therapy should be reinforced.

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