

Very low HbA1C, is it a problem?

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Dear Editor

An important problem to manage diabetes mellitus is controlling the patients' blood glucose. Fluctuation of blood glucose results in molecular biochemistry change and can result in unwanted diabetic complications (1). In clinical practice, hemoglobin A1C (HbA1C) is a common useful laboratory test to follow-up patients with diabetes (2). Sometimes, an unexpected laboratory result can be observed. Here, the authors presented a case of extremely low hemoglobin A1C level and discussed its clinical importance.

The current study was a consultation case of an abnormally low HbA1C level. The patient was a 40-year-old male with the history of cerebral stroke and on control of diabetes mellitus. The patient was firstly diagnosed with diabetes mellitus at the time of diagnosis of stroke. The HbA1C level of this patient at the first time on the first diagnosis of diabetes mellitus was 7.2% (fasting plasma glucose 218 mg/dL). This case was on strict diet control and took oral metformin 2000 mg/day. The HbA1C levels at the 1st, 2nd, 3rd, 4th, 5th, and 6th months after the first diagnosis were 6.4%, 6.4%, 6.1%, 6.1%, 5.9%, and 5.9%, respectively. However, the aberrant result was observed on the 7th month that the HbA1C was 3.2%

(the fasting blood glucose level at this time was 92 mg/dL). The laboratory already checked and validated the result. The other laboratory investigations including complete blood count, blood lipid, uric acid, liver function test, and renal function test were within normal limit. Focusing on the performance of HbA1C test, the precision and accuracy of the test, coefficient of variation (CV) was 1.2% and mean bias +0.4 %, which were according to the clinical pathology standards (3). All tests were performed at an ISO15189 certified laboratory. Therefore, the main question is "What is the cause of abnormally low HbA1C in this case?"

To confirm the problem, repeated HbA1C test was performed and the fructosamine test was also performed in parallel. The low HbA1C level was still observed (3.3%). The fructosamine test was also performed and the abnormally low fructosamine level was observed. Hence, this case was consulted to a clinical pathologist expert. The expert verified and confirmed the correctness of laboratory analysis. The possible causes of the cases with abnormally low HbA1C are listed as a) extremely diet control of the patient, b) excessive use of antidiabetic drugs, and c) laboratory error. Also, hemolytic anemia or hem-

orrhage might be a cause of reduced HbA1c. Nevertheless, in the current case, there was no evidence of hemolytic anemia or hemorrhage (the reticulocyte count and serum bilirubin were within normal limits and the blood smear examination showed normal appearance). In the current case, laboratory error was excluded. History taking showed that the patient extremely practiced food restriction and avoided any fruit and sugar products after his onset of stroke. Also, the patient consumed only one-sixths of food amount that he did before the stroke. Under such circumstances, the patient felt fainting in the afternoon every day. He was suggested not to be too much diet restricted and the dosage of antidiabetic drug was reduced to 500 mg daily. After modification, the patient had no problem and the follow-up visits showed the normal HbA1C in the next three months and he never had the problem of extremely high or low HbA1C level to date (24th month after diagnosis of stroke).

Laboratory investigation is a tool of family physician to manage primary care for common diseases. The diabetes mellitus is a very common problem. The basic practice is to monitor the glucose control. Of several laboratory tests, hemoglobin A1C is a very good test that can be useful in clinical practice. The abnormally high HbA1C level can be observed in cases with underlying hemoglobinopathy, although

there is no problem of poor diabetes control (4). However, there are also some limitations in using due to the possibility of incorrect high result. The aberration of laboratory result can be observed in the area with high prevalence of hemoglobinopathy such as South-east Asia (5).

In general practice, the abnormally high HbA1C level is commonly observed in the patients with diabetes and poor diabetes control. However, the opposite case of the abnormally low HbA1C level is rarely mentioned. In the current case, an abnormally low HbA1C level was observed, which is not common in clinical practice. There are many possible causes as already mentioned, but the important concern is usually the laboratory error. Sometimes, the patients take herbal products with glucose lowering effects that can induce unwanted hypoglycemia. Nevertheless, in the current case, the patient did not take any additional herbal products, but excessively and strictly controlled intake of food. The excessive control can result in low blood glucose accumulation and low HbA1C. In the current case, although there is no clinical problem yet, the problem could exist if there were no detection of the abnormally low HbA1C level.

Conflict of interest

The authors declared no conflict of interest.

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