

Glycosylated Haemoglobin (HbA1c): Is it a reliable measure of Glycaemic control in all patients with Type 1 Diabetes Mellitus?

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Introduction HbA1c levels are used as objective long term measure of glycaemic control in patients with Type 1 Diabetes Mellitus (T1DM). Regular HbA1c measurement helps us to formulate the management and education to the patients and carers. But, in rare cases, it might not prove reliable, as in our case report.

Case Report A 4 years old girl with known T1DM and autoimmune hyperthyroidism, had mitral valve repair for mitral valve regurgitation. She was admitted with hyperglycaemia and ketosis 5 months following cardiac surgery when she was noted to be jaundiced. Subsequent investigations revealed DAT negative micro angiopathic haemolytic anaemia with elevated reticulocytes ($301 \times 10^9/L$), bilirubin (61 $\mu\text{mol/L}$), LDH (1713 IU/L), normal haemoglobin electrophoresis, G6PD screen, negative CMV/EBV/Parvovirus PCR and absent thrombus on echocardiogram. She was noted to have lower HbA1c against the persistent hyperglycaemia on her glucometer due to significant anaemia. Hence, serum fructosamine level was requested which was reported high, in sync with the blood glucose levels. She is now being monitored in the diabetes clinic with fructosamine level along with HbA1c to assess the trend of her blood glucose level and table shows the serial HbA1c levels and Fructosamine levels.

Haemoglobin (g/L)	HbA1c mmol/mol(%)	Fructosamine (micromol/L)	Mean Blood Glucose (mmol/L)	Corrected HbA1c mmol/mol(%)
59	37 (5.6%)	380	12.5	65 (8.1%)
94	35 (5.3%)	307	9.5	51 (6.8%)
86	40 (5.8%)	370	10.3	63 (7.9%)

Discussion Fructosamine levels indicate the blood glucose control over the past 2-3 weeks. HbA1c and fructosamine are highly correlated with following formula.

$$\text{HbA1c} = 0.017 \times \text{fructosamine level } (\mu\text{mol/L}) + 1.61.$$

HbA1c measurement is not a reliable marker of glycaemic control in diabetics with condition associated with shortened red blood cell life span. Haemolytic anaemia should be considered if there is discrepancy between HbA1c levels and blood glucose levels and Fructosamine can be used a marker of glycaemic control.

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