

ASK EXPERT: Blood Sugar Management in Children with Diabetes



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Diabetes is associated with complications afflicting the nerves, kidneys, eyes and the large vessels, the latter predisposes to stroke and heart attacks. The quest for good control is with the intention of avoiding these. While it was believed that good control would protect against the diabetic complications but it was not until 1993 that this was firmly established in children with type 1 diabetes by the landmark trial - the DCCT.

Significance of blood sugar monitoring and insulin

Monitoring glucose levels is integral to the management of diabetes and serves the twin purposes of assessing the efficacy of the administered dose as also the safety for this has to be achieved with minimal or no hypoglycaemia. Clinical methods to recognise low as well as high sugars have their limitations as symptoms are apparent only at extremes in both the situations.

However since all the patients are on insulin there is a risk of hypoglycaemia and this becomes the limiting factor for better control. The chance of hypoglycaemias increases exponentially when attempts are made to normalise the glucose levels. The targets therefore are based on the capacity of the child to recognise, respond to and correct them; certainly they are looser in the younger children.

Management of type 1 diabetes is dependent on taking insulin from outside and balancing diet and exercise to achieve near normal blood glucose levels. Children with type 1 diabetes need insulin for life and depending upon changing requirements on daily basis, insulin dose needs to be adjusted. Self-monitoring of blood glucose and HbA_{1c} measurement are methods available for glucose monitoring. Both these techniques give information about the effectiveness of the management plan on glycaemic control.

Self-Monitoring and HbA_{1c} in children with diabetes

Monitoring of glucose entails measurement of the current blood sugar levels by venous or more conveniently capillary glucose estimation. The measured value accurately reflects the blood glucose at that point of time. It is

influenced by the quantity of the meal, physical exercise and the insulin dose. To be adequately reflective of the trends or patterns throughout the day, these need to be measured more frequently. The key to good control however lies in taking corrective action for the abnormal values rather than simply recording and storing them for the physician's perusal.

Self-monitoring gives regular feedback to the patient and confirms the effect of food, exercise and medication. The knowledge that he is in possession of a device which can accurately inform him about the blood sugars is reassuring for the patient and permits dose titration more effectively and safely. Decisions on how frequent testing should be done, needs to be made taking into consideration the clinical requirement and finances. Ideally, a child with type 1 diabetes needs to monitor blood glucose levels four¹ or more times per day. A good fasting and pre meal values should be between 70-130mg/dL² and post meal values should be less than 180 mg/dL. Blood sugar monitoring is needed on daily basis but more frequently during any acute illness, any change of drug therapy or during periods of poor control.

HbA_{1c} or Glycosylated Haemoglobin³ - is a test which measures the average (d) or summated blood glucose over the last 2- 3 months. HbA_{1c} needs to be measured 2-4 times a year and one aims to achieve HbA_{1c} lower than 7%. This test is currently one of the best ways to check, if diabetes is under control during the previous 2 to 3 months.

How are these tests undertaken?

Self-monitoring - is done through blood glucose meter. These glucometers use a strip of plastic containing chemicals or electrodes which gives rise to an electric current or colour change when a small drop of blood, normally taken from finger is placed on the strip. Self-Monitoring accuracy is user and instrument dependent, so it is important to evaluate each patient's monitoring technique, both initially and at regular intervals.

HbA_{1c} - Can be done anytime of the day irrespective of meal timings and insulin dose, in any standard medical laboratory.

Which Test Is Better - fasting plasma glucose (FPG) and postprandial plasma glucose (PPG) levels or HbA_{1c} test?

The important thing is to understand that no one test is adequately reflecting the entire day's sugar values; they all have their strengths and weaknesses. Fasting plasma glucose (FPG) and postprandial plasma glucose (PPG) levels are different ways to monitor short-term treatment changes as these tell how well a person is doing at that point in the day. In a patient who is on multiple injections the FPG generally mirrors the effectiveness of the longer acting (basal) insulin whereas the PPG shows how effective the short/rapid acting insulin taken prior to that

meal has been. On the other hand, an HbA_{1c} test will provide information that FPG and PPG can't, because it represents long-term program compliance. As a corollary one could imagine the ambient values of glucose as the current share value of a chip while the HbA_{1c} is the Q3 result, both complement each other but neither can supplement the other.

Ultimate goal for treatment

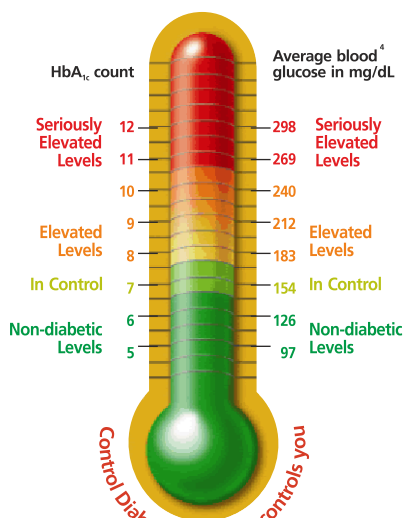
The goal of treatment is that children can achieve good blood glucose control. Since extremely high or low blood glucose levels are both bad for the body, it is important to try to keep blood glucose levels as even as possible to avoid complications.

Current Indian Scenario

Adequate management of type 1 diabetes requires making informed decision based on blood glucose monitoring along with taking insulin. Almost all the burden of treatment falls on the family of the child with type 1 diabetes. Huge financial burden results in suboptimal treatment and thus suboptimal outcomes for the child.

Changing Diabetes in Children (CDiC) program

Novo Nordisk Education Foundation along with 21 specialized centres across India has tried to address the critical gap in the management of type 1 diabetes through its CDiC program. The 4000 children registered in the program are provided with comprehensive care which includes free human insulin, glucose monitoring (both self - monitoring and HbA_{1c}) and diabetes education. Each child gets a free consultation and diabetes education from the specialist every 3 months. CDiC is committed for changing the outcomes in poor children with type 1 diabetes.



If you would like to have more information on type 1 diabetes you can write to us at CDiCIndia@novonordisk.com

1. <http://care.diabetesjournals.org/content/28/1/186.full> accessed on 26th Feb. 2. <http://www.diabetes.org/living-with-diabetes/treatment-and-care/blood-glucose-control/tight-diabetes-control.html> accessed on 26th. 3. <http://www.diabetes.org/living-with-diabetes/treatment-and-care/blood-glucose-control/a1c/> accessed on 26th Feb. 4. Source ADA.