

Oral Glucose Tolerance Test

By Dr. Yasmine Sami

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Intended learning outcomes



Explain the types of the blood glucose tests

Define the Oral Glucose Tolerance Test

Introduction

The various disorders in carbohydrate metabolism may be grouped into several categories depend primarily upon laboratory finding:

- Those associated with a raised plasma glucose concentration (Hyperglycemia).
- Those associated with a decreased plasma glucose concentration (Hypoglycemia).

Introduction

The detection of glucose in body fluids is important in the **diagnosis of diabetes** and in the **investigation of hypoglycemia**

- ❖ **Diabetes is a disease manifested by hyperglycemia.**
- ❖ **Clinical diagnosis should not be made on single test result ;it should integrate clinical and other laboratory data**

Blood glucose disorders

➤ High glucose (Hyperglycemia)

If blood sugar levels remain too high the body suppresses appetite over the short term. Long-term hyperglycemia causes many of the long-term health problems including heart disease, eye, kidney and nerve damage.

The most common cause of hyperglycemia is diabetes mellitus

➤ Low glucose (hypoglycemia)

If blood sugar levels drop too low a potentially fatal condition called hypoglycemia develops. Symptoms may include lethargy, irritability, shaking, twitching, pale complexion, sweating, paranoid or aggressive mentality and loss of consciousness

Blood glucose disorders

The most frequently encountered disorder of carbohydrates metabolism is a high blood glucose due to DM.

Estimation of the glucose concentration in blood are required to:

- Help in the diagnosis of diabetes mellitus (DM).**
- Management of DM patients.**
- Monitoring of treatment in DM patients.**

Types of Blood Glucose Tests

Fasting Blood Glucose

§ (formerly called '**Fasting Blood Sugar**' or **FBS**). This test measures the level of glucose in the blood after fasting for at least 8 hours.

Hemoglobin A1C

§ This test provides an overview of your blood sugar (glucose) level over a three-month timespan

Types of Blood Glucose Tests

Random Blood Glucose

§ This test is performed via blood draw at the lab when you're not fasting. It gives an indication into how your body handles the increased blood sugar levels triggered by eating. In general, a random blood glucose test result over **200 mg/dL** may indicate diabetes.

Glucose Tolerance Test (GTT)

§ For this test, the person has a fasting glucose test done, then drinks a 75-gram glucose drink. Another blood sample is drawn 2 hours after the glucose drink.

Oral Glucose Tolerance Test (OGTT)

- This test is done in hospitals for confirmation of some query cases of DM.
- The OGTT is not recommended for routine use under the ADA guidelines because this procedure is inconvenient for patients



The pathologist will give you:
75 ml glucose drink

Then ask you to:
Wait 2 hours



Take blood
and test
glucose
levels



Oral Glucose Tolerance Test

- The ability to utilize carbohydrates can be determined by **Glucose tolerance test.**
- **Initially fasting blood glucose is estimated**
- **A loading dose of glucose is given.**
- **The blood glucose levels are estimated at regular intervals after the glucose load**
- **In conditions of insulin deficiency, blood glucose levels get elevated due to impaired utilization of glucose**

Patient preparation

There are some important steps before the test is performed:

- a. The test should be **explained** thoroughly to the patient
- b. The patient is instructed to have **normal carbohydrate diet**
for 3 days prior to the test.
- c. **Fasting** for at least 10 hours

Patient preparation

- d. The test should be performed in the **morning**
- e. During the test, the patient should be resting and **cannot smoke eat or drink** (except the water)
- f. The patient should **avoid drugs** likely to influence the blood glucose levels

Procedure of standard oral glucose tolerance test

- ❑ **First** blood sample is a **fasting sample** taken from the patient
- ❑ A solution containing 75 g of glucose is administered
- ❑ **Second** blood sample is drawn **2 hours** later
- ❑ If the test is done in pregnancy to diagnose Gestational DM, the test is a *modified OGTT*, the sample is drawn 1 hour after 50 g of glucose is administered

Interpretation of the results

1. Categories of **fasting plasma glucose**:

Normal fasting glucose	<110 mg/dl	<6.1 mmol/L
Impaired fasting glucose	110-125 mg/dl	6.1-7.0 mmol/L
Provisional DM diagnosis	≥126 mg/dl	≥7.0 mmol/L

Interpretation of the results

2. Categories of **2-hours plasma glucose**:

Normal glucose tolerance	2 hours	<140 mg/dl	<7.8 mmol/L
Impaired glucose tolerance	2 hours	140-200 mg/dl	7.8-11.1 mmol/L
Provisional DM diagnosis	2 hours	≥200 mg/dl	≥11.1 mmol/L

Extra investigation mandatory for diabetic patients

Hemoglobin A1C (HbA1c)

➤ This test can be used to indirectly measure blood glucose levels

Hemoglobin is a protein that red blood cells use to transport oxygen. When haemoglobin is exposed to glucose, it gets converted into **haemoglobin A1c**. Because haemoglobin molecules are recycled every few months, the percentage of haemoglobin in the A1c form can be used as a measurement of the average blood glucose level over the past two to three months. Normal level of **HbA1c** should be $\leq 5.4\%$

Extra investigation mandatory for diabetic patients

Urinalysis

The parameters detected by chemical urine examination are:

1. **Glucose:** a diagnosis of DM should never be made on the basis of glycosuria. However, patients are able to monitor their therapy by testing for glycosuria
2. **Ketones:** ketonuria indicates starvation and diabetic ketoacidosis (DKA)

Extra investigation mandatory for diabetic patients

3. Albumin: one of the earliest signs of diabetic renal dysfunction is the development of small amounts of albumin in urine called Microalbuminuria. If untreated, this can progress overt proteinuria, impaired renal function and finally end stage renal failure.

Diabetic nephropathy progresses over years and may be delayed by good glycemic control

Extra investigation mandatory for diabetic patients

Microalbuminuria is defined as urinary albumin excretion of **30-300 mg/day**.

- A random urine sample or timed overnight collection is useful to assess urinary albumin excretion. Proteinuria is typically greater than **0.5 g/day**
- A patient is determined to have microalbuminuria when **2 of three** specimens collected within a six-month period are abnormal

Blood glucose monitoring



THANK YOU !

ANY QUESTIONS ??

PLEASE ASK