Oral glucose tolerance test: pre-analytical factor interference

ORAL GLUCOSE TOLERANCE TEST: A CASE STUDY ON PREANALYTICAL FACTOR INTERFERENCE DUE TO LEMONADE ADDING

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ABSTRACT

Oral glucose tolerance test (OGTT) is a useful test in diagnosis of diabetes mellitus. Here, the author presented an interesting case study on pre-analytical factor interference on OGTT. Some additional information on the preanalytical error for OGTT is also quoted in this article.

Key words: Glucose, tolerance test, error, preanalytical

INTRODUCTION

Basically, glucose is the sugar that the body uses for energy. In glucose homeostasis, both hormone and enzyme play altogether to regulate the glucose metabolism. Considering the hormone, two hormones, insulin and glucagon from the pancreas play major role in glucose homeostasis. The abnormality in the glucose homeostasis results in several clinical disorders and the most well-known clinical disorder is diabetes mellitus (DM). For diagnosis of fasting plasma glucose is the standard clinical test. Current research is aiming to define the blood glucose levels at which risks increase so that clinical management can be appropriately directed. When available, the criteria required to justify population screening should be satisfied. However, there is another functional test, which can give more details on the glucose homeostasis in the patients. The quoted test is the glucose tolerance test. The most common glucose tolerance test is the oral glucose tolerance test (OGTT). In clinical practice, OGTT is used in obstetrics. The OGTT is used to screen pregnant women for gestational diabetes between 24 and 28 weeks of pregnancy.

CASE REPORT

A case of aberrant OGTT laboratory result was reported to the physician in-charge at the clinical laboratory. In this case, the patients have the results of 75 gm OGTT as fasting = 312 mg/dL, 1 hour = 85 mg/dL and 2 hours = 216 mg/dL. The obstetrician suspect for
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some possible errors in the laboratory analysis, therefore, he sent an incident report on this episode to the laboratory.

From the root cause analysis, all of the laboratory analysis was performed with in a clinical chemistry laboratory using a standard clinical chemistry analyzer. Further history taking, the patients has well preparation for the OGTT and had no external identified source of interference. From further review, the error can be seen at the venipuncture clinic of the hospital. The phlebotomist arranged the request forms and the collected blood samples with incorrect order.

DISCUSSION

Indeed, quality control is necessary for all laboratory test. The control in pre-analytical, analytical and post-analytical period for glucose tolerance test is recommended. Most of the problematic case for glucose tolerance test is in the pre-analytical phase. The hyperemesis gravidarum is the main interference of the OGTT. OGTT can result in the abnormal low glucose level and can be an unacceptable aberrant laboratory result. In additional to hyperemesis gravidarum, the inference from drug is another important factor contributing to aberrant OGTT result. Those drugs include thiazide diuretics, Beta-blockers, oral contraceptives and prednisone.

In this case, the preanalytical error can be seen. It is a good example of preanalytical error in OGTT, which can be expected at any clinical laboratory. Indeed, the preanalytical error is the most common type of error in laboratory process. In this case, all of the analyses in the laboratory were correct but the defect is at the venipuncture clinic. This is a random error, which is usually due to human error.

Table 1. Summarization of preanalytical error for OGTT.

<table>
<thead>
<tr>
<th>Possible causes of error</th>
<th>Possible underlying causes</th>
<th>Possible preventive action</th>
</tr>
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<tbody>
<tr>
<td>1. no fasting</td>
<td>Poor patient compliance</td>
<td>Good information providing</td>
</tr>
<tr>
<td>2. hyperemesis gravidarum</td>
<td>Pregnancy physiology</td>
<td>Control of emesis</td>
</tr>
<tr>
<td>3. incorrect patient</td>
<td>Malpractice of the phlebotomist</td>
<td>Venipuncture guideline</td>
</tr>
<tr>
<td>identification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. improper specimen</td>
<td>Malpractice of the phlebotomist</td>
<td>Specimen transportation guideline</td>
</tr>
<tr>
<td>transportation</td>
<td>Ingestion of external source of sugar (such as</td>
<td></td>
</tr>
<tr>
<td>5. interference from</td>
<td>lemonade to decrease emesis during OGTT)</td>
<td>Good clinical and laboratory practice guideline</td>
</tr>
<tr>
<td>external source of sugar</td>
<td></td>
<td></td>
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</tbody>
</table>

In this case, the phlebotomist had several malpractices. First, the patient identification was severely missed. Second, the transportation of the specimen was also incorrect. Indeed, the transportation of any specimens for blood glucose monitoring has to be performed within half an hour after blood collection. This case can be a good case study
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for quality control in OGTT test in any laboratory. The summarization of possible preanalytical error for OGTT is presented in Table 1.

COMPETING INTERESTS

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

REFERENCES