

Case Report

Serum fructosamine: More reliable than false positive both 1 and 3 hour OGTTs

Udaya M Kabadi MD^{1,2*} and Sarah Exley LPN¹

¹Broadlawns Medical Center, Des Moines, Iowa

² University of Iowa, Iowa City, Iowa

Abstract

Present laboratory tests, 1 hour and 3 hour OGTTs for assessment of GDM are apparently cumbersome and inconvenient because of requiring ingestion of overtly large quantities of liquid glucose and preparation. We recently documented random serum fructosamine level as a reliable convenient diagnostic test for GDM.

Case Report: Diagnosis of GDM was 'entertained' by 1 hour OGTT and 'confirmed' by 3 hour OGTT in 30 year old pregnant woman at 24 weeks. However, during a visit to endocrinology clinic visit, she was asymptomatic and all one hour post prandial blood sugars during 2 weeks since the diagnosis were <140 mg/dl. Point of contact blood sugar about an hour after lunch was 96 mg/dl raising suspicion of diagnosis. Therefore, we conducted CGMS for 10 days and determined serum fructosamine and HbA1c levels. CGMS documented mean 1 hour post prandial blood sugar, 123± 6 mg/dl indicating erroneous diagnosis of GDM. Serum Fructosamine and HbA1c levels were in the range documented in pregnant women without GDM.

Conclusion: Both OGTTs were false positive as documented by normal CGMS and serum fructosamine concentrations.

Teaching Point: Random serum fructosamine concentration may be a simple and more reliable and convenient than OGTT as screening test in diagnosis of GDM.

Introduction

Screening tests for assessment of GDM, established by ACOG and ADA, are decades old and involve ingestion of liquid glucose and pre-testing preparation [1, 2]. Many pregnant women experience vomiting during pregnancy, which is further exacerbated by ingestion of liquid glucose. Moreover, oral glucose tolerance tests are inconvenient and are already being replaced in non-pregnant subjects by HbA1c and random or fasting blood glucose as recommended by ADA [3]. OGTT, especially over 3-hours, is artificial since 100g of glucose is probably never be ingested within 10-15 minutes in the life of an individual. Finally, we have recently documented utility of serum fructosamine level as a reliable simple test for diagnosis of GDM confirmed by CGMS [4].

This case report demonstrates that HbA1c and serum fructosamine levels matched closely with average blood sugar over 10 days determined by CGMS and thus

excluded the diagnosis of GDM in our subject who failed both 1-hour and 3-hour OGTT indicating false positivity for both OGTTs.

Case Report

30-year-old woman presented to endocrinology clinic for her routine follow up visit for Graves' disease with hypothyroidism during pregnancy at 28 weeks. She was diagnosed with GDM following 1-hour and 3-hour OGTTs at the obstetrics clinic visit a week earlier (Table 1). She was referred to the diabetes educator for instruction in life style modification. She was essentially asymptomatic as documented by absence of polyuria, polydipsia, nocturia, inability to gain weight, dizziness, etc. Physical examination was essentially unremarkable including normal vital signs. Both prior pregnancies were uneventful full term without diagnosis of GDM and normal deliveries of healthy infants with desirable body weights.

*Corresponding Author:

Udaya M Kabadi, MD, FACP, FRCP (C), FACE, Adjunct Professor of Medicine, University of Iowa, Iowa City and Chief, Endocrinology, Broadlawns Medical Center 1801, Hickman Road, Des Moines, Iowa 50314, USA; Tel: 5152823041.

Email: ukabadi@gmail.com

Received Date: 03 Nov, 2022

Accepted Date: 07 Nov, 2022

Published Date: 18 Nov, 2022

Table1. 1 hour and 3 hour OGTTs at 28 weeks during pregnancy

Variable	Fasting	1 Hour	2 Hour	3 Hour
1 hour GTT	□	173*	□	□
3 hour GTT	93	217	158	83
Normal Range for 3 Hour OGTT	<95	<180	<155	<140

*Normal range for 1 hour OGTT is <140 mg/dl

We conducted point of contact blood sugar test by a finger stick to confirm the diagnosis of GDM. Blood sugar was 96 mg/dl at the time around 1:30pm, about an hour after lunch raising the concern about the diagnosis. Therefore, we also assessed serum fructosamine concentration twice with an interval of 3 weeks as it is documented to be a reliable diagnostic test when matched with CGMS in our recent report [4]. We also determined HbA1c concentrations at the time of initiation of continuous glucose monitoring for 10 days by professional Libre device (Abbot Laboratories, Inc. Abbot Park, Illinois, USA). Finally, we reassessed Free T4, TSH, fructosamine, HbA1c and fasting glucose concentrations at 6 weeks postpartum. These laboratory tests were performed by the local laboratory at the institution. Both 1-hour and 3-hour OGTTs conducted in the obstetrics clinic suggested presence of GDM (**Table 1**). However, serum fructosamine and HbA1c concentrations were in the reference normal ranges documented in pregnant women without GDM (**Table 2**). Furthermore, CGMS for ten days revealed mean blood sugar of 91 ± 4 mg/dl and mean 1 hour postprandial blood sugar 123 ± 6 mg/dl, consistent with fructosamine and HbA1c levels confirming absence of GDM. Subject delivered a healthy baby weighing 7.5 lbs at full term. Postpartum serum fructosamine returned to the range documented in non-pregnant women in the local laboratory..

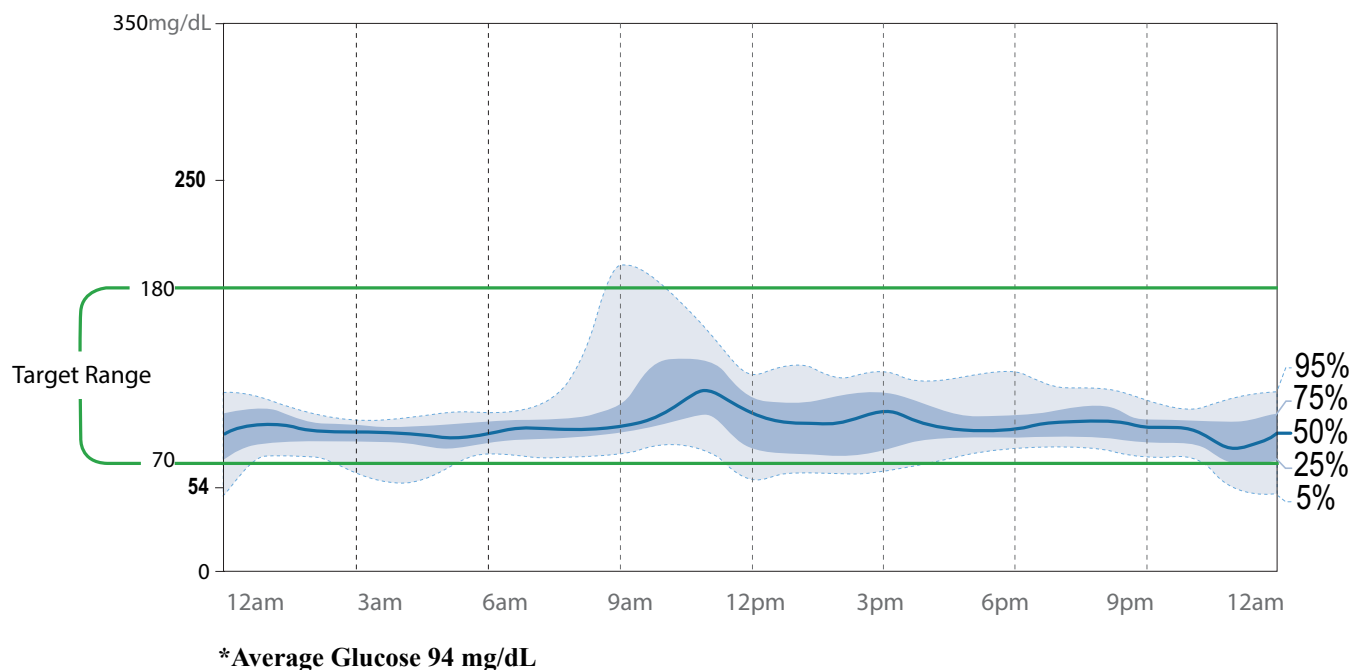
Discussion

This case report demonstrates that both OGTTs may provide false positive results as documented by CGMS and serum fructosamine concentration. We believe that false positive OGTTs may be attributed to the ingestion of an incredibly high quantity of glucose in a very short time compared to the usual amounts consumed at any single occasion during daily living. Moreover, lack of recommended preparation may also contribute to false positive results. Therefore, it is apparent that serum fructosamine concentration may be a more precise and a simpler screening test in diagnosis of GDM as confirmed by CGMS when compared with both 1-hour and 3-hour OGTTs. It may be distinctly more convenient as it requires neither fasting nor the ingestion of an extraordinary amount of glucose as well as preparation. Finally, it could be conducted during a regular clinic visit at any time of the day. Obviously, this observation is limited to this preliminary case report. However, preliminary findings in a large study examining the utility of serum fructosamine in diagnosis are encouraging [5]. This study documented greater accuracy and reliability of fructosamine in a comparative analysis between the current 2-step testing recommended by ACOG and ADA [1,2].

Table2. Serum Fructosamine, HbA1c, Free T4 and TSH Concentrations at 28 weeks of pregnancy and 12 weeks postpartum.

Variable	2/25/2022	6/22/2022	8/24/2022
Fructosamine 205 - 285 mM/L *	158	167	233
Hb A1C 4.8-5.6% *	<3.9	<3.8	<3.9
TSH 0.550-4.780 mIU/mL *	3.28	0.03	3.21
Free T4 0.89-1.76 ng/dL *	1	1.6	1.2
Random Glucose 65-140 mg/dl*	□	97	82

* Normal Range

Figure 1: Continuous glucose monitor over 1 week*

References

1. No authors listed (2018) ACOG Practice Bulletin No. 190: Gestational Diabetes Mellitus Obstet Gynecol 131: e49-e64.
2. American Diabetes Association (2021) Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2021. Diabetes Care 44: S15-S33.
3. American Diabetes Association (2021) Glycemic Targets: Standards of Medical Care in Diabetes-2021. Diabetes Care 44: S73-S84.2
4. Udaya M Kabadi, Sarah Exley (2021) Fructosamine as a Screening Test for Gestational Diabetes. Journal of Gynecology Research Reviews & Reports. 3: 1-2.
5. Udaya M Kabadi, Sarah Exley. Fructosamine as a screening test for gestational diabetes. Endocrine Society annual meeting, June 2022.