

The estimation of fructosamine and HbA1c in pregnant women with diabetes mellitus

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Summary: Fructosamine, HbA1c, glucose, albumins and total proteins were estimated in 40 healthy pregnant women and 80 pregnant women with insulin dependent diabetes mellitus. Fructosamine was estimated by the NBT method with "Fructosamine test" commercially available kit on Technicom automatic analyser RA-1000. Glucose was determined on Beckmman glucose analyser. HbA1c was assayed by the Bio-Rad test, while albumin and total proteins by Beckmman tests. For all estimated parameters no significant differences were found between healthy pregnant women and pregnant women with insulin dependent diabetes mellitus.

Key words: Fructosamine; Glycolised hemoglobin; Pregnancy; Diabetes.

INTRODUCTION

Fructosamines a generally accepted expression for glycolised albumin as most abundant protein. It is a ketoamine a product of nonenzymatic reaction between sugar (usually glucose) and proteins (usually albumin). Fisher⁽¹⁾ was the first to synthesize it back in 1986. According to Rietz⁽²⁾, when the glucose concentration in the blood is increased, other proteins such as membrane proteins, eye lens proteins and albumins can be glycolised and all of them are called fructosamine. This is a trivial name for l-amino-l-deoxy fructose, which is called isoglucosamine.

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The estimation of HbA1c is important in the follow up of diabetes mellitus treatment and is used as a marker for diabetic control. Because of the long half life (about 120 days) of haemoglobin i.e. erythrocytes, a level of glycolised haemoglobin remains increased in the blood longer than glucose.

Therefore short - term changes of glucose in the blood can be much better detected by the estimation of glycolysed hemoglobin.

MATERIALS AND METHODS

For our study we chose a group of 40 healthy pregnant women and 80 pregnant women with insulin dependent diabetes mellitus, both being in the third trimester of pregnancy.

Fructosamine was estimated by the NBT method using a commercially available test from Hoffman La Roche on automatic analyser Technicom RA - 1000. All estimations were done in serum. Serum is stable for 7 days at 2-8°C or 3

Table 1. — Levels in healthy pregnant women N=40.

	Fructosamine mmol/L	HbAlc %	Glucose mmol/L	Albumin g/L	Total proteins g/L
\bar{X}	2.988	4.462	4.861	34.26	68.44
SD	6.72	2.08	1.96	14.77	16.23
Kv (%)	9.11	13.64	8.55	21.64	31.53

Table 2. — Levels in pregnant women insulin dependent diabetes mellitus N=80.

	Fructosamine mmol/L	HbAlc %	Glucose mmol/L	Albumin g/L	Total proteins g/L
\bar{X}	3.439	5.071	7.321	34.75	70.32
SD	8.14	3.62	0.88	10.72	14.82
Kv (%)	5.30	10.82	2.14	19.83	21.32
p	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05

months if kept at -20°C . Glucose was determined enzymatically on a Beckman analyser. For the HbAlc assay the Bio-Rad test was used. The serum sample was stable for 8 days at $2-8^{\circ}\text{C}$. Albumin and total proteins were determined colorimetrically on an Astra 8, Beckman.

RESULTS

In Table 1. the results obtained for all parameters estimated in healthy pregnant women are shown and in Table 2 the results in diabetes mellitus dependent (IDDM) pregnant women are presented.

DISCUSSION

From Table 1 it can be seen that in healthy pregnant women the value for fructosamine was 2.988 mmol/L, compared to 3.439 mmol/L in the IDDM (Table 2), meaning that, later, fructosamine is not significantly increased.

Values for HbAlc were lower 4.462% in the IDDM than in healthy pregnant women, where it was 5.071%.

Glucose in healthy pregnant women was 4.861 mmol/L and in the IDDM 7.321 mmol/L showing no significant differences.

There were hardly any changes in albumin concentrations. Values for healthy pregnant women were 34.26 g/L and for IDDM 34.75 g/L.

According to J. Baker⁽³⁾ a classical method for glucose assay in blood and urine in diabetics is not specific considering the many factors that can interfere, such as drugs etc.

The oral GTT is useful in early diagnosis of diabetes, although many factors should be taken into consideration in the interpretation of test results⁽⁴⁾.

Now days a new, simple colorimetric method for the follow up of glycolysated hemoglobin i.e. fructosamine in serum is available. This method, because of its simplicity and accuracy, has advantages over all the other methods used so far.

There is evidence in literature that sex, unlike age, has no influence on fructosamine values, which we took into consideration during our investigations.

The values we obtained for fructosamine are in agreement with those reported by other authors performing similar investigations in diabetics^(5, 6, 7).

Fructosamine and HbAls give similar clinical information, although fructosamine

reacts more quickly in therapy changes or on the patients metabolic status⁽⁸⁾.

CONCLUSION

Fructosamine is stable for 5 days if kept at 4°C, and 30 days on -20°C.

In our opinion the estimation of fructosamine and HbA1c in serum are two important methods in following the cases of diabetic pregnant women.

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