



ASSESSMENT OF DIABETES MELLITUS: TARGET VALUES AND MONITORING EFFICIENCY OF THERAPY BY FRUCTOSAMINE

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BACKGROUND

The measurement of fructosamine (FRU) is useful in monitoring short to medium glyceimic control in DM, over the past 2-3 weeks.

Diabetes mellitus(DM) can be assessed by the long term monitoring and control of glucose levels as short term indicator. When blood glucose levels are abnormally elevated the concentration of fructosamine also increases.

In DM glycosylation is intensified, mostly glycosylated are immunoglobulines , albumin , C3 , fibrinogen , transferin , haptoglobin , α 1-antitrypsin.

Measurement of these glycosylated proteins (FRUCTOSAMINE TEST) gains insight in blood glucose levels over the past 2-3 weeks (Straus, 2010; Davidson and Sittman, 2012).

Clinical application of fructosamine:

- For monitoring of metabolic regulations of DM
- Screening test for gestational DM
- In pediatric clinics for the long term monitoring and control of DM for childrens and young people
- Control of therapy in insulin dependent diabetics
- It's important for short term monitoring and control of glucose levels and useful extra biomarker with HbA1c and lipid status

•When levels of glucose are increased the concentration of fructosamine (FRU) also increased.

METHODS

- The studied subjects were
 - the control group(136 healthy subjects)
 - the experimental group(188 DM patients).
- The experimental group divided in four groups:

- M1 – 54 non-insulin dependent DM patients(NIDDM) on diet;**
- M2 - 68 NIDDM patients on oral antidiabetes therapy;**
- M3 – 32 NIDDM patients on insulin;**
- M4 – 34 insulin dependent patients (IDDM).**

Patients were both sexes, age matched and monitoring in last 3 weeks. We performed FRU determinations(by NBT colorimetric method).

Glucose concentration was measured by GOD-PAP method.

Reference value for za fructosamine are until **285 μ mol/l for healthy individuals** and concentration of **glucose for healthy individuals are 3,8-6,10 mmol/l.**

AIM

The aim of the study was to evaluate diagnostic efficiency for monitoring of DM by fructosamine assay.

RESULTS

- FRU and glucose values in serum were significantly higher ($p < 0,01$) in all groups of patients compared to the control group during whole period of monitoring of DM.
- FRU was significantly correlated with glycemia over the past 2 weeks.
- The results of examined parameters in all groups have shown the following values:
 - M1 for glucose $7,36 \pm 1,39$; and FRU values ranged from 258-320 μ mol/l;
 - M2 glucose $9,60 \pm 3,77$; FRU 346-386 μ mol/l;
 - M3 glucose $12,25 \pm 3,62$; FRU 447-509 μ mol/l;
 - M4 glucose $15,01 \pm 5,95$; FRU 497-587 μ mol/l;
 - control group $5,05 \pm 0,75$; FRU 174-225 μ mol/l.

Table 1. Statistical parameters for group M1- non-insulin dependent DM patients(NIDDM) on diet (n=54)

PARAMETER	CONTROL GROUP	NIDDM ON DIET	P
Age (years)	57,00 \pm 4,22	57,30 \pm 6,07	NS
BMI (kg/m ²)	26,4 \pm 2,4	27,3 \pm 2,8	NS
Fasting glucose (mmol/l)	5,05 \pm 0,75	7,36 \pm 1,39	P<0,01
Concentration of Fructosamine (μ mol/l)	174-225	258-320	P<0,01

Normal BMI-
18,5-24,9 kg/m²

Table 2. Statistical parameters for group M2- NIDDM patients on oral antidiabetes therapy (n=68)

PARAMETER	CONTROL GROUP	NIDDM NA ORAL ANTIDIABETES THERAPY	P
Age (years)	57,00 \pm 4,22	57,84 \pm 5,55	NS
BMI (kg/m ²)	26,4 \pm 2,4	27,6 \pm 3,9	NS
Fasting glucose (mmol/l)	5,05 \pm 0,75	9,60 \pm 3,77	P<0,01
Concentration of Fructosamine (μ mol/l)	174-225	346-386	P<0,01

Table 3. Statistical parameters for group M3- NIDDM patients on insulin therapy (n=32)

PARAMETER	CONTROL GROUP	NIDDM ON INSULIN THERAPY	P
Age (years)	57,00 \pm 4,22	62,66 \pm 7,29	P<0,01
BMI (kg/m ²)	26,4 \pm 2,4	26,0 \pm 3,7	NS
Fasting glucose (mmol/l)	5,05 \pm 0,75	12,25 \pm 3,62	P<0,01
Concentration of Fructosamine (μ mol/l)	174-225	447-509	P<0,01

Table 4. Statistical parameters for group M4- insulin dependent patients (IDDM)(n=34)

PARAMETER	CONTROL GROUP	IDDM PATIENTS	P
Age (years)	32,75 \pm 8,44	34,74 \pm 12,28	NS
BMI (kg/m ²)	23,2 \pm 3,6	21,9 \pm 3,3	NS
Fasting glucose (mmol/l)	4,58 \pm 0,64	15,01 \pm 5,95	P<0,01
Concentration of Fructosamine (μ mol/l)	174-225	497-587	P<0,01

CONCLUSIONS

Simultaneous determination of both parameters allows us to emphasize the recent metabolic decompensation.

The results suggest that fructosamine assay is useful medium-term marker to monitor diabetic patients in regard to their therapy.

Fructosamine is useful biomarker in DM on oral antidiabetes therapy and non-insulin dependent DM patients (NIDDM) on diet , because there is no variation in concentrations of glucose as well as in insulin dependent patients (IDDM).

If DM had better control , with self-control of patients and with adequate therapy ,therefore exists the better possibilities of prevention for development of short-term and long-term complication as well as micro and macrovascular complication of DM (Aleksandrovski,2011; Rios,2012; Mazzone, 2013).