Markers of endothelial and autonomic dysfunction in early stages of glucose intolerance and in metabolic syndrome

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AIM

The present study aims to evaluate sE-selectin and Endothelin-1 as markers of endothelial function and autonomic tone at early stages of impaired glucose tolerance and in metabolic syndrome (MetS).

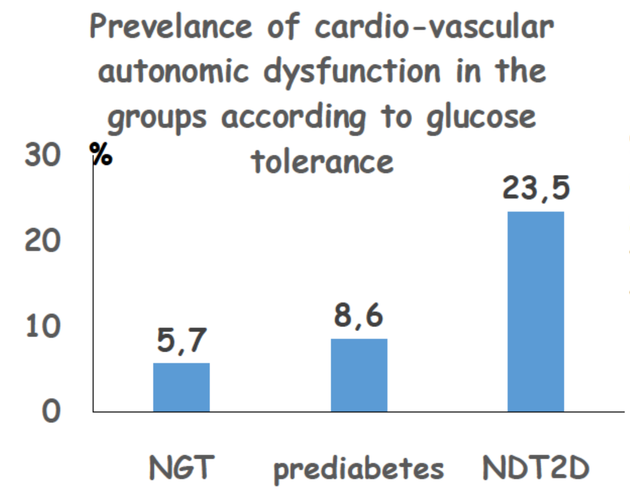
MATERIAL

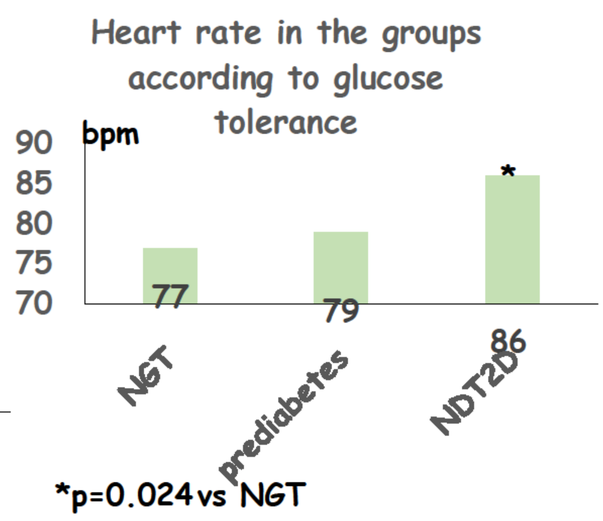
Main characteristics of the participants in the groups according to glucose tolerance				
	N	Males	Age (years)	BMI (kg/m2)
NGT	35	16	45,5±14,1	28,7±6,5
prediabetes	35	7	44,8±10,2	33,3±5,9
NDT2D	17	16	48,0±8,5	33,2±6,8
Main characteristics of the participants in the groups according to metabolic syndrome				
	N	Males	Age (years)	BMI (kg/m2)
without MetS	21	7	43,1±13,2	25,0±5,2
with MetS	66	32	46,5±11,0	33,5±5,7

METHODS

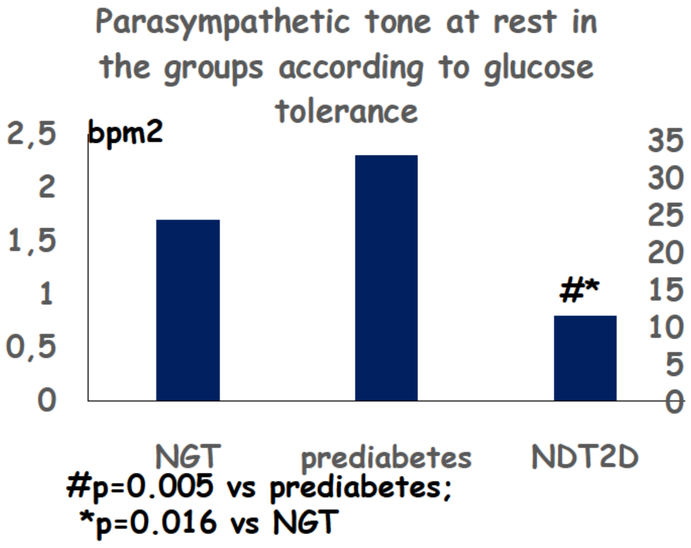
- Glucose tolerance was studied during a standard OGTT applying 2006 WHO criteria.
- Plasma glucose was measured by a hexokinase method.
- Serum lipids – total cholesterol, HDL-cholesterol, triglycerides, were assessed by enzyme-colorimetric tests.
- HbA1c was measured in whole blood immuno-turbidimetrically.
- Plasma sE-selectin and Endothelin-1 were estimated at fasting using ELISA test.
- Weight and height were measured and BMI was calculated.
- Waist circumference was measured in the horizontal plane midway between the lowest rib and the iliac crest.
- Blood pressure was measured twice in seated position.
- MetS was defined according to 2005 IDF criteria.
- Autonomic function was assessed by ANX-3.0 monitoring technology using frequency-domain analysis at rest and during standard clinical tests: deep breathing, Valsalva maneuver, and standing from a seated position.
- Statistical analysis was performed using SPSS v.20.0.

RESULTS

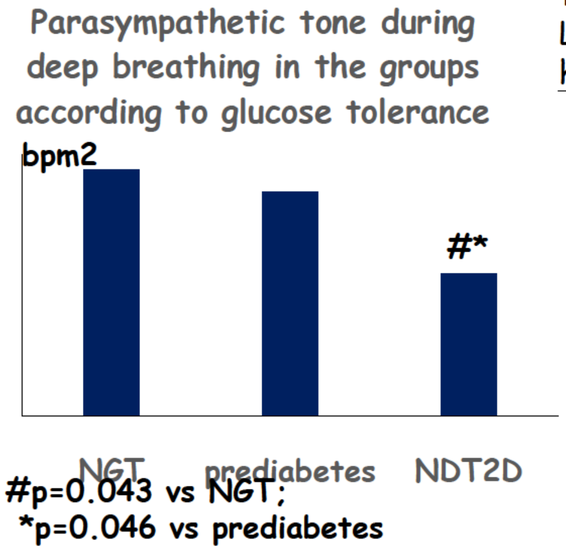




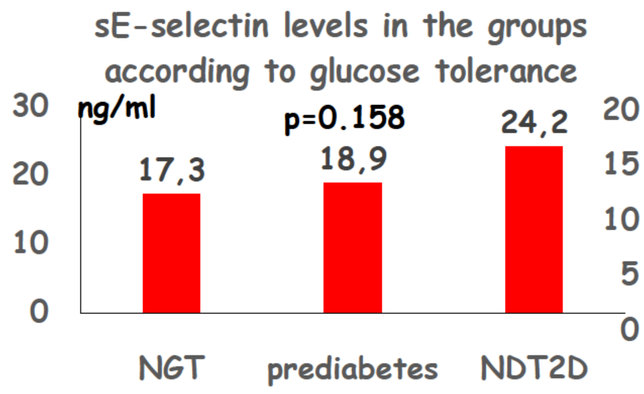
*p=0.024 vs NGT

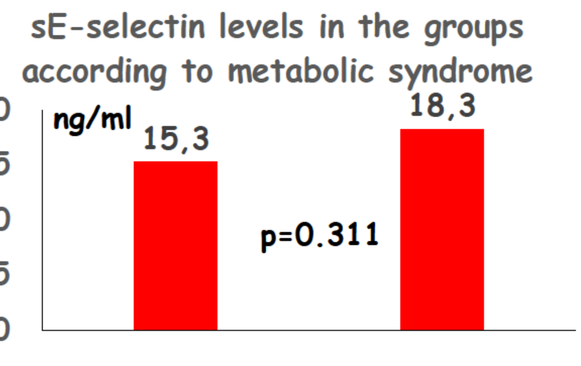


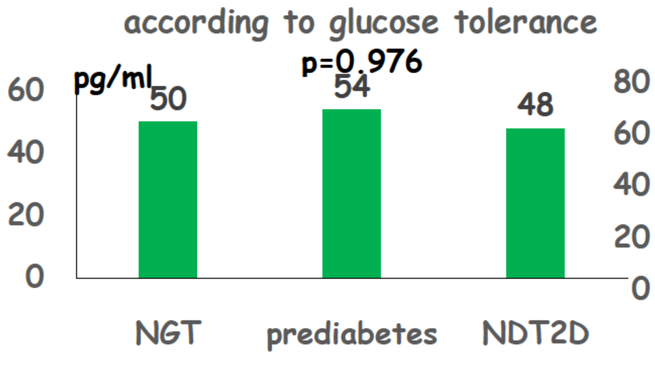
#p=0.005 vs prediabetes;
*p=0.016 vs NGT

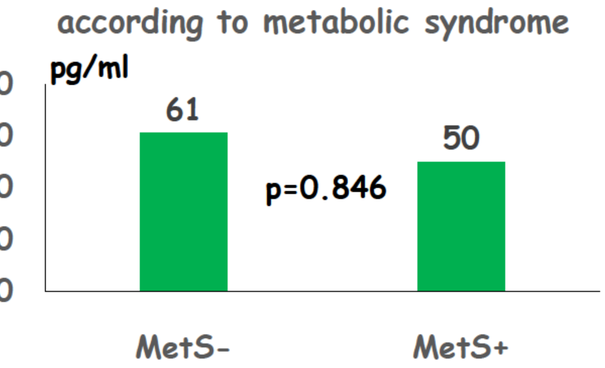


#p=0.043 vs NGT;
*p=0.046 vs prediabetes









Correlation between sE-selectin, Endothelin-1 and autonomic function indices and cardio-metabolic parameters in the studied cohort

parameters	sE-selectin		Endothelin-1	
	Corr Coeff (r)	p	Corr Coeff (r)	p
age	-0,02	0.889	0,09	0.433
waist circumference	0,02	0.478	-0,18	0.101
BMI	-0,02	0.871	-0,1	0.369
fasting plasma glucose	**-0,21**	**0.050**	0,01	0.992
120-min plasma glucose	0,17	0.124	-0,07	0.554
HbA1c	0,12	0.260	-0,02	0.890
systolic blood pressure	0,08	0.475	0,15	0.173
diastolic blood pressure	0,11	0.294	0,07	0.514
total cholesterol	-0,01	0.933	-0,09	0.442
HDL-cholesterol	-0,03	0.792	0,12	0.282
triglycerides	0,11	0.320	-0,13	0.250
LDL-cholesterol	-0,02	0.849	-0,14	0.194
heart rate	**0,21**	**0.047**	0,01	0.963
	sympathetic tone		**parasympathetic tone**	
age	**-0,38**	**<0.001**	**-0,56**	**<0.001**
waist circumference	**-0,31**	**0.005**	**-0,3**	**0.006**
BMI	**-0,39**	**0.003**	**-0,3**	**0.006**
fasting plasma glucose	-0,08	0.457	-0,15	0.156
120-min plasma glucose	-0,12	0.288	-0,18	0.108
HbA1c	**-0,28**	**0.013**	**-0,24**	**0.022**
systolic blood pressure	-0,03	0.818	-0,08	0.470
diastolic blood pressure	-0,01	0.982	-0,03	0.786
total cholesterol	-0,05	0.656	-0,09	0.390
HDL-cholesterol	0,02	0.863	0,14	0.195
triglycerides	0,05	0.676	0,01	0.936
LDL-cholesterol	-0,11	0.320	-0,12	0.276
heart rate	**0,4**	**<0.001**	**-0,28**	**0.011**

CONCLUSION

Our results demonstrate that slight increase in plasma glucose and the presence of MetS do not influence sE-selectin and Endothelin-1 concentrations. Autonomic tone is affected at early stages of impaired glucose homeostasis, the main determinants being age, long-term glycemic control, obesity, total and LDL-cholesterol.