Brain-derived Neurotrophic Factor and Matrix Metalloproteinases as markers of metabolic status in girls with Turner Syndrome

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INTRODUCTION

Turner syndrome (TS) predisposes to obesity and related metabolic disorders and presents a high risk of congenital heart defects. Growth hormone (GH) treatment used in TS girls also affects the parameters of carbohydrate-lipid metabolism. Thus, the search for new markers that could be early predictors of metabolic disorders seems to be justified.

AIM & METHOD

1. The assessment and comparison of :
- **MMP-1, MMP-2, MMP-9** (matrix metalloproteinase-1, -2, -9),
- **BDNF** (brain-derived neurotrophic factor),
- **GDNF** (glial cell line derived neurotrophic factor),
- **VEGF** (vascular endothelial growth factor)

concentration and basic clinical makers (total cholesterol, HDL cholesterol, triglycerides, glucose, ALT, AST, IGF1, TSH and fT4) in:

- **12 untreated (before GH therapy) TS girls (study group),**
- **17 healthy short stature girls (control group).**

2. Evaluation of shifts in markers concentrations in **9 TS girls after at least 3-month GH treatment period.**

RESULTS

- no differences in mean age, weight, BMI Z-Score and hSDS between study and control group;
- groups differed in mean baseline values of:
  - ALT,
  - BDNF,
  - MMP-2;
- a positive correlation between:
  - MMP-2 and HDL concentration ($\beta = 0.502$, $t(17) = 2.393$, $p=0.029$),
  - BDNF and BMI Z-score ($\beta = 0.582$, $t(17) = 2.948$, $p=0.009$);
- a significantly higher concentration of MMP-2 in patients undergoing GH treatment than before the onset of therapy (132.1 ±42.3 vs. 105.0±45.5, p=0.045).

	Study group (n=12)	*Control group (n=17)*	*P value*
Tch [mg/dl]	186.9 ± 26.4	177.9 ± 20.5	NS
LDL [mg/dl]	118.0 ± 20.0	101.2 ± 22.0	NS
HDL [mg/dl]	53.5 ± 8.5	61.6 ± 10.5	NS
TG [mg/dl]	76.7 ± 31.7	75.8± 23.1	NS
fT4 [ng/dl]	1.45 ± 0.26	1.34 ± 0.13	NS
TSH [IU/ml]	2.99 (2.71 – 3.33)	2.325 (1.84 – 3.00)	NS
ALT [IU/l]	**18.2 ± 4.2**	**14.2 ± 4.1**	**0.02**
AST [IU/l]	29.9 ± 7.1	31.8 ± 5.2	NS
glucose`0 [mg/dl]	88.1 ± 7.6	86.1 ± 6.3	NS
IGF1 [ng/ml]	178.3 ± 89.5	138.3 ± 57.7	NS
VEGF [pg/ml]	15.99 (6.19 – 22.72)	48.11 (13.93 - 92.48)	NS
MMP-9 [ng/ml]	165.41 (97.36 – 385.00)	227.96 (193.87 – 380.19)	NS
BDNF [pg/ml]	**29951.54 (26176.87 – 41271.88)**	**23131.69 (18392.37 – 28313.33)**	**0.01**
MMP-1 [pg/ml]	2078.14 (1408.12 – 2539.28)	1489.91 (992.25 – 2495.51)	NS
MMP-2 [ng/ml]	**91.84 (71.71 – 111.03)**	**143.63 (123.67 - 244.46)**	**<0.001**

CONCLUSIONS

- **The higher concentrations of BDNF and lower of MMP-2 in TS girls without metabolic syndrome may reflect the formation of metabolic status.**
- **Shifts in MMP-2 concentration during GH therapy may be considered as connected with metabolic alterations.**

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