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

Blaszczzyk Ewa¹, Gawlik Jakub², Gieburowska Joanna³, Tokarska Agnieszka¹, Francuz Tomasz¹, Gawlik Aneta¹

¹ Department of Pediatrics and Pediatric Endocrinology, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Poland
² Student Scientific Society, Department of Biophysics, Jagiellonian University Medical College, Poland
³ Department of Biochemistry, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Poland

INTRODUCTION
Turner syndrome (TS) predisposes to obesity and related metabolic disorders and presents a high risk of congenital heart defects. Growth hormone (GH) treatment 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 T4) in:
   o 12 untreated (before GH therapy) TS girls (study group),
   o 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:
  o ALT,
  o BDNF,
  o MMP-2:
    • a positive correlation between:
      o MMP-2 and HDL concentration (β = 0.502, t(17) = 2.393, p=0.029),
      o BDNF and BMI Z-score (β = 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).

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.

ACKNOWLEDGEMENTS
The authors wish to thank all patients and their families for participating in this study.

CONTACT INFORMATION
Corresponding author: Ewa Blaszczzyk, Department of Pediatrics and Paediatric Endocrinology, Faculty of Medical Sciences, Medical University of Silesia 40-752 Katowice, ul. Medyków 16, Poland e-mail: ewa_g2@wp.pl

REFERENCES

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
T4 (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 | 142.4 ± 4.1 | 0.02
AST (IU/L) | 29.9 ± 7.1 | 31.8 ± 5.2 | NS
glucose (mg/dl) | 88.1 ± 7.6 | 86.1 ± 6.3 | NS
IGF1 (ng/ml) | 178.3 ± 89.5 | 138.3 ± 57.7 | NS
VEGF (ng/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) | 2995.54 (26176.87 – 41271.88) | 2313.69 (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