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OBJECTIVES

The aim of the study was to examine the effects of excessive GH secretion on the blood antioxidant system: total antioxidant capacity (TAC) of plasma; superoxide dismutase (SOD) and catalase activities (CAT); ceruloplasmin (CP); non-protein thiol (NT), level of thiobarbituric acid reactive substances (TBARS)

METHODS

11 patients (8 women, 3 men; age 48.6±9.2 yr) with active acromegaly were included in the study. The data of 9 volunteers (4 women, 5 men; age 34.2±7.2 yr) without endocrine disease used as control. The parameters of the blood antioxidant system, complete blood count, insulin-like growth factor 1 (IGF-1), level of haemoglobin and total cholesterol were also measured.

The parameters of the blood prooxidant and antioxidant systems (spectrophotometric data)

Parameters	Substance function
Total antioxidant capacity of plasma	total antioxidant capacity (TAC) of plasma was evaluated by FRAP (ferric reducing antioxidant power or ferric reducing ability of plasma), the TAC value proportional to the reducing power of the mainly nonenzymatic antioxidants in the plasma, mainly uric and ascorbic acids, but don't detect reduced glutathione and liposoluble antioxidants (e.g. carotinoids)
Non-Protein Thiols, (NT)	Proportional to reduced glutathione's level, take action in hydrogen peroxide utilization in blood
Thiobarbituric acid reactive substances (TBARS)	Proportional to the level MDA as end product of lipid peroxidation, one of the main markers of oxidative stress in plasma
Erythrocyte superoxide dismutase activity (SOD)	Utilization of superoxide anion radicals in erythrocytes with the formation of hydrogen peroxide (in blood)
Erythrocyte catalase activity (CAT)	Catalyzes of the decomposition of hydrogen peroxide to water and oxygen (in blood)
Ceruloplasmin (CP)	Converts of superoxide anion radicals in plasma into water without formation of hydrogen peroxide, and plays a role in the transport, distribution and metabolism of Cu and Fe initiating generation of ROS

RESULTS

The clinical data of acromegaly patients

Parameters	mean±SD	Reference Range
Height, cm	168,9±9,0	–
Weight, kg	88,6±17,0	–
IGF-1, ng/mL	718±350	88-250
Haemoglobin, g/L	121±26	w – 120-140 m – 135-160
Total Cholesterol, mMol/L	5,7±1,3	3,3-5,2

The antioxidant status parameters

Parameters	Control mean±SD	Acromegaly mean±SD	Significance level, p<0.05
Total antioxidant capacity of plasma, a.u.	0.43±0.06	0.35±0.02	0.00226
Non-Protein Thiols, µMol/ml	7.2±1.5	8.3±0.8	0.18054
TBARS, nMol/mL	3.4±0.7	5.1±0.5	0.00445
Superoxide Dismutase (SOD), a.u./g Hb	22.0±6.7	16.2±1.9	0.01971
Catalase (Cat), a.u./g Hb	183±45	172±13	0.51938
Ceruloplasmin, µkg/mL	394±76	579±42	0.00123

* - significant difference between patients with acromegaly and control, using Mann-Withney test, p<0.05

RESULTS

In patients with acromegaly the TAC levels and SOD activity were significantly lower (for 20% and 30%), than corresponding control data, whilst TBARS and CP levels were significantly higher (for 50% and 40% respectively)

CONCLUSIONS

The present work has demonstrated that parameters of the blood antioxidant system are impaired in patients with active acromegaly, what indicates the development of oxidative stress

References

Brazhe NA, Baizhumanov AA, Parshina EY, et al. Studies of the blood antioxidant system and oxygen-transporting properties of human erythrocytes during 105-day isolation. *Human Physiology*. 2014;40(7):804-809. doi:10.1134/s0362119714070020

Authors have nothing to disclose

