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INTERRELATION BETWEEN THYROID HORMONES, CATECHOLAMINES, NEUROTICISM AND PHYSICAL AGGRESSION IN MEN WITH HIGH AND MIDDLE NEUROTICISM LEVELS

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Aggression in normal ranges is necessary to provide a survival of individual, but excessive aggression has negative consequences for both individuals and society. The research of aggression formation mechanisms is very important to understand excessive aggression manifestations. Monoaminergic brain systems have a great influence on the emotions and behavior, including aggression, in humans and animals. The thyroid system influences neurotransmitters (particularly serotonin and norepinephrine). According to scientific literature data, both high impulsive and premeditated aggressions are associated with high neuroticism.

Taking into account the above mentioned, the interrelation between blood serum levels of thyroid hormones and catecholamine, neuroticism and physical aggression in men with high and middle neuroticism levels was studied.

In total group of participants moderate positive correlations between neuroticism and T_4 , between neuroticism and T_3 , negative correlation between T_4 and norepinephrine were revealed. In men with high neuroticism level the significant positive correlations between neuroticism and T_4 , between neuroticism and physical aggression were found. In men with middle neuroticism level only the significant negative correlation between T_3 and epinephrine was observed.

No significant differences in T_3 , T_4 , norepinephrine, epinephrine levels between individuals with high and middle neuroticism levels were found, although difference in T_4 level was almost significant. It was higher in men with high neuroticism than in individuals with middle neuroticism.

Obtained results indicate the involving thyroid hormones in such personality trait formation as neuroticism.

The absence of correlation between thyroid hormones and neuroticism in individuals with middle neuroticism level is possible due to the prevalence or different hormones or mediators in neuroticism development in men with high and middle neuroticism. It is confirmed by our early published results about exis-

tence of significant positive correlation between blood serum cortisol content and neuroticism in men with high neuroticism level and strong positive correlation between blood serum estradiol content and neuroticism in men with middle neuroticism level.

The existence of negative correlations between T_4 and norepinephrine in total group of participants, between T_3 and epinephrine in men with middle neuroticism level may be explained by influence of thyroid hormones on beta-adrenergic signaling system and by inverse correlation between the density of adrenoceptors and catecholamine levels.

So thyroid hormones participate in the formation of such personality traits as neuroticism, in particular, in the formation of a high level of neuroticism, which is confirmed by the existence of a reliable positive correlation between thyroid hormones and neuroticism in total group and in men with high neuroticism level. The absence of interrelation between thyroid hormone levels and neuroticism in men with middle level of neuroticism together with published data about an existence of correlation between cortisol and neuroticism in persons with high neuroticism and between estradiol and neuroticism in individuals with middle neuroticism indicates the predominance of different hormones in neuroticism development in men with high and middle neuroticism levels.

Keywords: thyroid hormones, men catecholamine, neuroticism, physical aggression.

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Introduction. Aggression in normal ranges is necessary to provide a survival of individual, but excessive aggression has negative consequences for both individual and society. The research of aggression formation mechanisms is very important to understand excessive aggression manifestations. Monoaminergic brain systems have a great influence on the

emotions and behavior [1], including aggression [2, 3], in humans and animals. The thyroid system influences neurotransmitters (particularly serotonin and norepinephrine) [4]. Free T_3 level in the criminal Antisocial Personality Disorder (APD) group is found to be significantly higher than that in the noncriminal APD group, but in the criminal APD group, there is no significant correlation between thyroid hormone levels and aggression [5]. Connection between T_3 levels and violent/aggressive behavior is shown not only in males but also in females with borderline personality disorder [6]. According to scientific literature data, both high impulsive [7, 8] and premeditated [8] aggressions are associated with high neuroticism.

The purpose of the paper is the investigation of interrelation between blood serum levels of thyroid hormones and catecholamine, neuroticism, physical aggression in men with high and middle neuroticism levels.

Materials and Methods. The study involved 32 young men aged 18 to 22 years. Neuroticism and physical aggression were estimated using Eysenck Personality Inventory and Buss-Durkee Hostility Inventory, respectively. Physical aggression was assessed in a percentage of the maximum level. The level of neuroticism was estimated in points. After processing the answers to Eysenck Personality Inventory, we determined the level of neuroticism in each participant in the study. According to the results ob-

tained, we divided the general group into three subgroups depending on the neuroticism level (low level of neuroticism – less than 7 points, middle level of neuroticism – 8–13 points, high level of neuroticism – more than 14 points).

Hormone levels in blood serum were determined by Testosterone, Estradiol, Cortisol ELISA kits (Italy), Norepinephrine and Epinephrine ELISA kits (China).

Statistical analysis of the results was carried out by methods of nonparametric statistics using the package “Statistica 6.0”. Mann-Whitney test was used to compare groups in pairs. Correlation analysis according to Spearman was used to reveal the relationship between different variables of the same group.

Results and Discussion. In total group of participants moderate positive correlations between neuroticism and T_4 ($r=+0.49$, $p=0.029$), between neuroticism and T_3 ($r=+0.44$, $p=0.0506$), negative correlation between T_4 and norepinephrine ($r=-0.38$, $p=0.032$) were revealed.

In men with high neuroticism level the significant positive correlations between neuroticism and T_4 ($r=+0.78$, $p=0.0075$), between neuroticism and physical aggression ($r=+0.69$, $p=0.041$) were found.

In men with middle neuroticism level only the significant negative correlation between T_3 and epinephrine ($r=-0.78$, $p=0.0075$) was observed.

No significant differences in T_3 , T_4 , norepinephrine, epinephrine levels between individuals with high

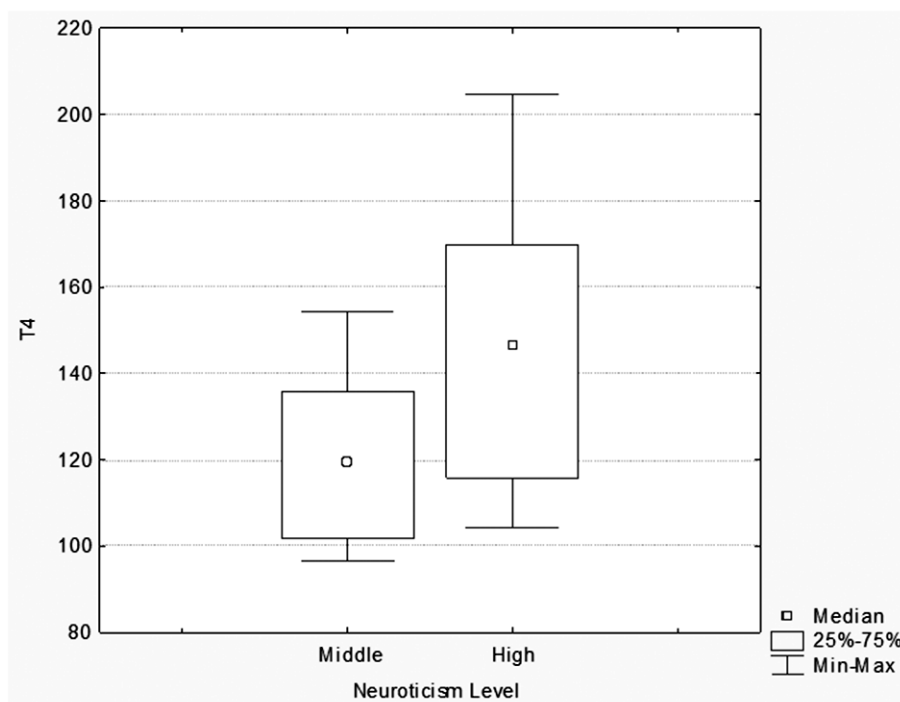


Figure 1. T_4 (nmol/L) level in blood serum of young men with high and middle neuroticism levels (Me [25%; 75%], min and max; $p=0.079$)

and middle neuroticism levels were found, although difference in T_4 level was almost significant ($p=0.079$). It was higher in men with high neuroticism than in individuals with middle neuroticism (**Figure 1**).

Obtained results indicate the involving thyroid hormones in such personality trait formation as neuroticism.

The absence of correlation between thyroid hormones and neuroticism in individuals with middle neuroticism level is possible due to the prevalence of different hormones or mediators in neuroticism development in men with high and middle neuroticism. It is supported by existence of significant positive correlation between blood serum cortisol content and neuroticism in men with high neuroticism level and strong positive correlation between blood serum estradiol content and neuroticism in men with middle neuroticism level [9].

The existence of negative correlations between T_4 and norepinephrine in total group of participants, between T_3 and epinephrine in men with middle neuroticism level may be explained by influence of thyroid

hormones on beta-adrenergic signaling system [10] and by inverse correlation between the density of adrenoreceptors and catecholamine levels [11].

Conclusions

1. Thyroid hormones are involved in the formation of such personality trait as neuroticism, in particular, in the formation of a high level of neuroticism, which is confirmed by the existence of a reliable positive correlation between thyroid hormones and neuroticism in total group and in men with high neuroticism level.
2. The absence of interrelation between thyroid hormone levels and neuroticism in men with middle level of neuroticism together with published data about an existence of correlation between cortisol and neuroticism in persons with high neuroticism and between estradiol and neuroticism in individuals with middle neuroticism indicates the predominance of different hormones in neuroticism development in men with high and middle neuroticism levels.

Prospects. The research of interrelation between blood serum levels of thyroid hormones, catecholamine, neuroticism and physical aggression in women with different neuroticism levels.

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ВЗАЄМОЗВ'ЯЗОК МІЖ ТИРЕОЇДНИМИ ГОРМОНАМИ ТА КАТЕХОЛАМІНАМИ, НЕЙРОТИЗМОМ ТА ФІЗИЧНОЮ АГРЕСІЄЮ У ЧОЛОВІКІВ З ВИСОКИМ ТА СЕРЕДНІМ РІВНЯМИ НЕЙРОТИЗМУ

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Резюме. У молодих чоловіків з високим та середнім рівнями нейротизму було досліджено взаємозв'язок між тиреоїдними гормонами та катехоламінами, нейротизмом і фізичною агресією. У загальній групі чоловіків було виявлено позитивні зв'язки між нейротизмом та T_4 , нейротизмом та T_3 та негативний кореляційний зв'язок між T_4 та норепінефрином. У чоловіків з високим рівнем нейротизму виявлено позитивні зв'язки між нейротизмом та T_4 , нейротизмом та фізичною агресією. У чоловіків із середнім рівнем нейротизму виявлено тільки негативний зв'язок між T_3 та епінефрином. Результати роботи свідчать про залучення тиреоїдних гормонів до розвитку нейротизму, зокрема у чоловіків з високим рівнем нейротизму, та про переважання різних гормонів при формуванні середнього та високого рівнів нейротизму.

Ключові слова: тиреоїдині гормони, катехоламіни, нейротизм, фізична агресія, чоловіки.

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ВЗАИМОСВЯЗЬ МЕЖДУ ТИРЕОИДНЫМИ ГОРМОНАМИ И КАТЕХОЛАМИНАМИ, НЕЙРОТИЗМОМ И ФИЗИЧЕСКОЙ АГРЕССИЕЙ У МУЖЧИН С ВЫСОКИМ И СРЕДНИМ УРОВНЯМИ НЕЙРОТИЗМА

Попова Л. Д., Васильева И. М., Наконечная О. А.

Резюме. У молодых людей с высоким и средним уровнями нейротизма была исследована взаимосвязь между тиреоидными гормонами и катехоламинами, нейротизмом и физической агрессией. В общей группе мужчин были обнаружены положительные корреляционные связи между нейротизмом и T_4 , нейротизмом и T_3 и отрицательная корреляция между T_4 и норэпинефрином. У мужчин с высоким уровнем нейротизма были выявлены положительные корреляционные связи между нейротизмом и T_4 , нейротизмом и физической агрессией. У мужчин со средним уровнем нейротизма обнаружена отрицательная корреляционная связь между T_4 и эпинефрином. Результаты работы свидетельствуют о вовлечении тиреоидных гормонов в формирование нейротизма, в частности у мужчин с высоким уровнем нейротизма, а также о преобладании разных гормонов в формировании среднего и высокого уровней нейротизма.

Ключевые слова: тиреоидные гормоны, катехоламины, нейротизм, физическая агрессия мужчины.

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