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Research Article

DETERMINATION OF INDIVIDUAL TYPOLOGICAL CHARACTERISTICS OF THE BEHAVIOR OF RATS USING THE "OPEN FIELD" METHOD

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ABSTRACT

I'm The organism's reactivity to stress, endurance, changing living conditions, extreme situations and other stressful effects is the main criterion of the organism's adaptation and vitality.

In this study, laboratory rats were divided into groups according to the level of activity, and their various behaviors were evaluated in the "open field" test. In the test, the rats were released into the central sector of the arena, and the horizontal and vertical movement activity, the number of looks into the holes, and the number of defecation were recorded. Behavioral activity of animals was determined during 3-minute observation and the results were compared.

KEYWORDS

"Open space", low active, medium active, high active.

INTRODUCTION

The study of individual typological characteristics of the response of the central nervous system (CNS) of humans and animals to the influence of environmental factors and the mechanisms of disease occurrence is one of the most urgent problems among medical and biological sciences today. In recent decades, a special place in research has been taken by resistance in terms of the body's resistance to the effects of physical and emotional stressors, which determine an individual set of defense mechanisms against stress (Ashmarin, 1999, 2001; Seredenin, 2005). The reactivity of the organism to stress, resistance to stress, changing living

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conditions, extreme situations and other stressful effects is the main criterion of adaptation and vitality of the organism. At the same time, it has been shown that the typological characteristics of humans and animals are closely related to various physiological indicators [1,2,6,7]. In the literature, there is a description of the influence of the individual - typological characteristics of the nervous system, which have a genetic basis and determine the different reactions of the organism to various stress factors and the nature of adaptation. It can be seen that the typological division is promising for an adequate assessment of the state of physiological systems in normal and severe conditions, which is confirmed by many studies conducted in various fields of physiology and experimental medicine [3,4,5,6].,7]. The study of the disease through the approach to individual typological characteristics of behavior is adaptive reactions allows for a deeper understanding of the mechanisms and to identify new differential approaches to the prevention and treatment of various diseases, in particular, diabetes and its complications .

The purpose of the study: to evaluate the behavior of laboratory rats with different behaviors in the "Open Field" test.

MATERIALS AND METHODS

The experiment was conducted on 56 adult white male rats weighing 250-300 g, which were kept in standard vivarium conditions. All experiments were performed in accordance with the requirements of the European Convention for the Protection of Vertebrate Animals Used for Experimental or Other Scientific Purposes (Strasbourg, 1986). Behavioral actions were studied according to the methodology of Buresh Ya.I (1991) [9]. The test consists in quantifying the components of the behavior of an animal placed in a new open field, which is prevented from exiting by a wall surrounding the field . Regrouping, feeding, collection and other active manipulations of the animals were excluded at least 1 h before the test. The experiment was conducted in complete silence without extraneous sounds. The "open field" is a well-lit square arena 1 m by 1 m and 45 cm high, the floor of which is marked by square lines. The rat was released into the central sector of the arena and the horizontal, vertical movement activity, the number of looks into the holes, and the number of defecation were recorded. Behavioral activity of the animals was determined during a 3-min observation in voluntary units. According to the results of the "open field" test, all animals were divided into three groups using cluster analysis: high active, low active and medium active. Even in the literature, a highly active type of behavior is called active search, and a low active type is called passive-defense [10].

The results of experimental studies were statistically processed using Excel Microsoft software. Data are presented as mean (M) and standard error of the mean

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(m). Student's t test was used to test statistical hypotheses about differences between study groups. A difference at a probability level of 95% or more was considered a statistically significant change ($p < 0.05$).

Results In order to determine the individual typological characteristics of the animals' behavior, the analysis of the parameters of the rats' behavior in the "open field" (Table 1) showed that the average body weight of all animals did not differ. The main manifestations of individual typological characteristics of the behavior of rats were movement along the surface of the "open field", calculated by the number of crossed squares.

The horizontal activity of the animals was assessed by clicking on the peripheral and central squares. The number of intersections of peripheral squares, that is, in animals with an active type, this indicator was higher than in other groups of animals; rats crossed an average of 28.4 ± 0.9 peripheral squares, while passive animals had a statistically significant 7.4 times less. Average value was obtained in moderately active rats compared to other groups of animals. A significant change was also found in the value of the intersection of the central squares, but this change was not as sharp as the intersection of the peripheral squares, that is, this indicator in the active type of animals was statistically significantly 1.86 times more than in the animals of the passive type.

When comparing the data with the moderately active group, the number of intersections was 1.4 times higher. When analyzing the total number of square crossings, rats in the active group had 5 times more than passive rats and 2.3 times more than rats in the medium active group. In passive rats, this indicator was 2.2 times lower than in the group of animals with moderately active behavior. According to the data, the animals with high activity moved mainly along the periphery of the "open field" and rarely went out to its central part. Animals of the active type made 84.3% of the total physical activity in the periphery of the "open field" and 15.7% in the center, and in the group of animals of the passive type, 57.3% in the periphery and 42.7% in the center. In animals in the moderately active group, the ratio was 75.2% and 24.6%, respectively. When comparing the values of the groups, the vertical activity index did not differ significantly. In all groups of animals, the maintenance period was very low and short and did not differ significantly from each other. Most of the animals in the entire sample left a mean number of boluses in the arena, which did not differ significantly between groups, indicating that the animals had a relatively low level of anxiety, which may be due to the fact that all animals were well fed before the start of the experiment.

A group of animals with low-active and medium-active types of behavioral reactions showed a decrease in horizontal movement activity in the central and

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peripheral parts of the "open field". It is known from the literature that the decrease in movement activity indicators is an indicator of the manifestation of the protective indicator that occurs in response to stress [10]. An increase in this indicator indicates the occurrence of strong emotional stress of a negative nature, for example, anxiety, tension, restlessness [10, 11].

Table 1

Indicators of behavioral activity of laboratory rats with different types of behavior in the "open field" test

Groups	Indicators						
	Body weight, gr	Number of intersecting peripheral squares	Number of intersecting central squares	Total number of squares cut	Vertical activity	Chislo grooming, sht	The number of defecation
Medium active	288.7±1.5	11.2±0.3	3.67±0.15	14.9±0.3	3.18±0.20	4.80±0.22	1.65±0.16
Passive	298.3±7.3 P_2 >0.05	3.83±0.37 P_2 <0.001	2.85±0.13 P_2 <0.01	6.68±0.32 P_2 <0.001	2.73±0.31 P_2 >0.05	4.24±0.21 P_2 >0.05	1.41±0.21 P_2 >0.05
Active	288.8±1.4 P_1 >0.05 P_2 >0.05	28.4±0.9 P_1 < 0.001 P_2 <0.001	5.31±0.24 P_1 < 0.001 P_2 <0.01	33.7±1.0 P_1 < 0.001 P_2 <0.001	2.76±0.24 P_1 >0.05 P_2 >0.05	4.76±0.20 P_1 >0.05 P_2 >0.05	1.92±0.17 P_1 >0.05 P_2 >0.05

Note: P 1 - in relation to the group of animals of the passive type;

P 2 – indicator for the group of moderately active animals;

Thus, the results obtained from the experiment showed that according to the characteristics of the horizontal movement activity of the animals evaluated using the "open field" test , animals can be conditionally divided into three groups: animals with high activity. - active-search type, animals with moderate activity - intermediate type and animals with low activity - passive-defense type. According to the scientific literature, it can be assumed that the typological characteristics of rats divided into groups reflect physiological and biochemical differences based on the assessment of the stress behavior of rats exposed to an unfamiliar environment in the "open field" test. Therefore, in experimental animals, since they belong to different individual typological groups,

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there may be differences in the course of pathological conditions and the body's reaction to pathologies.

CONCLUSION

1. Based on the assessment of stress behavior of rats in the "open field" test, it can be assumed that the typological characteristics of rats reflect physiological and biochemical differences.

2. Since experimental animals belong to different individual typological groups, there may be differences in the course of pathological conditions and the body's reaction to pathologies.

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