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Dynamics of the Reactivity of the Autonomic Nervous System, the Hormone Estradiol, the Oxidized, Antioxidant System and Indicators of Endogenous Intoxication of Female Rats in the Post-Intensive Care Period After Modeling 10-Minute Clinical Death

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Abstract: Any extreme factors acting on the body provides oxidative stress, which, being a universal system that destroys the cellular structures of the body, is currently being thoroughly studied in various pathological conditions around the world. At the same time, the prooxidant, antioxidant system, and indicators of endogenous intoxication of MSM254 and MSM280 in violation of the reproductive system of females in the post-intensive care period have been insufficiently studied. The aim of this study is to identify the reactivity of the autonomic nervous system, the content of estradiol, malondialdehyde, catalase and indicators of endogenous intoxication in female rats in the post-intensive care period after modeling 10-minute clinical death. The object of the study was 15 mongrel, white, sexually mature female rats weighing from 160-180 g., in which the state of post-intensive care disease was simulated. In the early post-intensive care period, within 24 hours after modeling a 10-minute clinical death in the body of female rats during estrus and diestrus. It was revealed against the background of a predominance of the tone of the sympathetic nervous system, increased concentrations of estradiol, malondialdehyde and the index of endogenous intoxication - MSM 254 against the background of a decrease in catalase activity and protein stability index.

Keywords: clinical death, post-intensive care disease, autonomic nervous system, estradiol, MDA, catalase, MSM254, MSM280

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1. Introduction

Currently, depending on the development of society around the world, stress effects have their own specific character depending on the reactivity of the body [7, 17]. Any extreme effect on the body is provided at the level of the autonomous nervous system, which provides cascading activation of hormonal and other structures of the body [12, 16, 18]. Ensuring the adaptive reactions of the body eventually ends with overload hypoxia in the body. Such a reaction is manifested at a higher level in the centers of integrative regulation systems, in the central nervous system and the neuroendocrine system [2, 3, 4, 8, 17, 18, 19]. At the same time, an increase in the activity of the prooxidant system, a decrease in the activity of the body's antioxidant systems contributes to the accumulation of endogenous intoxication products in the body [14], which is manifested by the development of

destructive changes in cellular structures with a decrease in the productive state of the body's cells. With a decrease in the work of the antioxidant system, active electrons can cause a number of diseases, both chronic and degenerative, as well as accelerate the aging process of the body and cause acute pathologies. The antioxidant system is closely related to the body's anabolic hormones, which ensure cell resistance, that is, the reproductive state of the body's cells. Therefore, in the post-intensive care period, the study of the relationship between indicators of the autonomic nervous system, the prooxidant and antioxidant systems, as well as endogenous intoxication and hormones of the reproductive system of females remains an urgent problem.

2. Materials and Methods

The purpose of this study is to identify the reactivity of the autonomic nervous system, the content of estradiol, malondialdehyde, catalase and indicators of endogenous intoxication - MSM 254 λ , MSM280 λ in female rats in the post-intensive care period after modeling 10-minute clinical death.

The study was conducted on 15 mongrel female rats weighing 150-180 g. in which the indicators of the reactivity of the autonomic nervous system, estradiol content, activity of the prooxidant and antioxidant systems and endogenous intoxication were evaluated in the early post-intensive care period.

Post-resuscitation disease was modeled using the method of V.G. Korpachev [11]. The reactivity of the autonomic nervous system was determined using the Hildebrant coefficient [1]. Malondialdehyde was determined using the Krolyuk method [10]. Catalase was determined using the method of I.D. Steely [15]. Indicators of endogenous intoxication were determined using the Gabrel Yanni method [7]. Hormones of the reproductive system were determined by enzyme immunoassay.

3. Results and Discussion

The results obtained and their discussion. In the study of intact rats during estrus, the Hildebrant coefficient was 5.3 ± 0.04 , MDA - 1.32 ± 0.07 nmol/ml, catalase 45.8 ± 0.7 , nmol/ml, MDA/catalase 0.029 ± 0.002 , MSM254 -0.226 ± 0.01 MSM 280 -0.254 ± 0.01 , MSM280/MSM254 – protein stability coefficient (PSC) was 1.14 ± 0.07 . estradiol 214.7 ± 11.2 pg/ml.

During the diestrus period, the Hildebrant coefficient was 5.4 ± 0.04 , MDA -1.12 ± 0.07 nmol/ml, catalase 38.6 ± 2.4 nmol/ml, MDA/catalase 0.029 ± 0.002 , MSM254 -0.246 ± 0.02 , MSM280 -0.249 ± 0.004 , PSC 1.04 ± 0.1 , estradiol 81.8 ± 2.2 pg/ml. If the obtained data are interpreted with the data of Yu.O. Kovaleva [9], A.G. Karabayeva [18], then against the background of balanced reactivity of the autonomic nervous system, the content of estradiol in the blood, the compensated state of the pro- and antioxidant system, and indicators of endogenous intoxication during estrus and diestrus, the content of estradiol are in a normal functional relationship.

When simulating clinical death during estrus and diestrus, the Hildebrant coefficient increased to 5.7 ± 0.1 and 5.8 ± 0.1 ($P < 0.05$) compared with the data of intact rats, which was replaced by a predominance of the tone of the parasympathetic nervous system and cardiac arrest was ensured. At the same time, during the estrus period, an increase in estradiol was determined to 227.8 ± 0.6 pg/ml, MDA – to 1.542 ± 0.1 nmol/ml, the MDA/catalase coefficient to 0.03413 ± 0.001 , with a decrease in catalase activity to 45.18 ± 0.8 nmol/ml. Where there was a slight increase in the indicators of endogenous intoxication, that is, MSM254 to 0.2394 ± 0.01 , MSM 280 to 0.252 ± 0.01 , while some decrease in PSC to 1.05 ± 0.05 was revealed. but the indicators are insignificant compared with the data of intact rats ($P > 0.05$).

During the diestrus period, there was also a slight increase in estradiol indices to 88.2 ± 1.9 pg/ml, MDA to 1.284 ± 0.05 nmol/ml, a decrease in catalase 37.2 ± 0.5 nmol/ml, an increase in the MDA/catalase index to 0.03451 ± 0.001 , indicators of endogenous intoxication

MSM254 to 0.2508 ± 0.01 , MSM280 to 0.2508 ± 0.01 , and a slight decrease in PSC to 1.01 ± 0.04 , ($P > 0.05$) compared with the data of intact animals.

In the early post-resuscitation period after 24 hours, in animals in the state of estrus and diestrus, an increase in the Hildebrant coefficient of 6.3 ± 0.1 and 6.2 ± 0.1 ($P < 0.001$), estradiol content of 281.6 ± 5.1 and 103.8 ± 5.4 ($P < 0.01$), the MDA/catalase ratio index to 0.08967 ± 0.01 and 0.11697 ± 0.02 were detected, that is, an increase in MDA to 3.084 ± 0.5 and 3.084 ± 0.5 ($P < 0.01$), a decrease in catalase activity to $34,32 \pm 1.0$ and 27.2 ± 1.2 ($P < 0.001$), in this ratio of the prooxidant and antioxidant systems, a decrease in PSC to 0.56 ± 0.01 and 0.7 ± 0.1 ($P < 0.01$) was revealed, against the background of an increase in MSM254 to 0.2886 ± 0.004 and 0.3926 ± 0.1 ($P < 0.01$). Where the values of MSM280 were 0.2468 ± 0.004 and 0.2774 ± 0.01 and were within the intact animals and advanced groups ($P > 0.05$).

Thus, when simulating clinical death lasting 10 minutes, the detected increase in the Hildebrant coefficient indicates a predominance of activity of the sympathetic nervous system. Such activation of this system means activation of adaptive reactions in response to such a strong influence [6, 13, 18], which, in turn, was replaced by the superiority of the tone of the parasympathetic nervous system. That is, there was a breakdown in the adaptation system [13] and ended in clinical death.

In the early post-resuscitation period, by 24 hours after recovery, the predominance of the tone of the sympathetic nervous system during estrus and diestrus increased the content of the Hildebrant coefficient 1.69 and 1.8 times estradiol by 1.31 and 1.27 times, this indicates the activation of compensatory adaptive reactions in the body of female rats. At the same time, estradiol contributed to an increase in the sensitivity of alpha and beta adrenergic receptors to catecholamines and ensured the development of adaptive processes at a high level [12]. Against the background of this kind of reaction of the body of female rats, activation of the prooxidant system, a decrease in the activity of the antioxidant system contributed to the activation of indicators of endogenous intoxication and a decrease in the index of protein stability.

4. Conclusion

In the early post-intensive care period, within 24 hours after modeling a 10-minute clinical death in the body of female rats during estrus and diestrus. It was revealed against the background of a predominance of the tone of the sympathetic nervous system, increased concentrations of estradiol, malondialdehyde and the index of endogenous intoxication - MSM 254 against the background of a decrease in catalase activity and protein stability index.

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