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Assessment of negative factors influencing lipid peroxidation processes in men's sperm of reproductive age in regions of Aral Sea

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Abstract

Actual problems of modern reproductive health is the study of people living in the zone of ecological catastrophe Aral Sea region. To assess the state of oxidative metabolism in the germ cells of male reproductive age, the primary, total primary, secondary, and total end-products of lipid peroxidation (LPO) were determined. According to the survey revealed, activation of free radical oxidation leads to an increase in the level of diene conjugates, cetodienes, comprehensive primary, secondary, and end-products of lipid peroxidation, indicating that the destructive processes in the germ cells caused by negative factors in the zone of ecological disaster.

Keywords: Reproductive health; lipid peroxidation; environmental disaster; sperm.

Introduction

Environmental and human health – one of the problems to which currently attracts public attention the Republic of Kazakhstan. Scientific and technological revolution, in addition to the positive effects, led to the aggravation of contradictions between man and his environment. Capacity of industrial production, chemicals in agriculture, and other anthropogenic processes have brought fundamental changes in the ecological balance, in some cases, irreversible [1,2].

At the present stage of socio-economic development of society, in conditions exacerbated, the adverse trends in medical and demographic processes, significantly increase the relevance of studying the problem of reproductive health as one aspect of the demographic policy. But the solution to this problem is impossible without studying the reproductive potential of both women and men separately, and to identify factors that influence them.

Health is an important medical and social category that is associated with the development of human resources in the state. The main components include health and reproductive health. Health officials childbearing age,

their ability to reproduce are important aspects of public health [3,4].

One of the crisis regions of Kazakhstan is recognized area Aral Sea region, where sanitary and environmental conditions at the present time continue to deteriorate.

Earlier studies on a range of health, social, and environmental problems in the Aral Sea region are mainly devoted to the study of sanitary and epidemiological situation and the health of the population only in the zone of ecological disaster – the Aral and Kazalinsk areas. Most research in this area relates to aspects of children's health and women's reproductive health [5].

In recent years, the government is making significant steps to address socio-economic problems that have emerged in the Kyzyl-Orda region. Their implementation has contributed to some improvement in the health of a region. However, the scale of the environmental disaster in the Aral Sea region requires a pressing continue work to address them [6].

All of the above identified urgency of the problem and has served as the theoretical basis for the present clinical and laboratory studies of reproductive status of men on the state of lipid

Table 1: Indicators of lipid peroxidation in sperm of men living at the zone of environmental disaster, M ± m.

Regions/Indicators	Studied groups	DC, relative units/mole	CD, relative units/mole	TPP, conditional unit	SSP, conditional unit	SB, Conditional unit
Zone of Environmental disaster (village Aiteke-Bi, City Aralsk)	18-29 yrs	11.09 ± 0.47	10.84 ± 0.50	1.18 ± 0.16	1.05 ± 0.11	0.11 ± 0.02
	30-39 yrs	11.14 ± 0.49	11.39 ± 0.51	0.96 ± 0.03	0.97 ± 0.13	0.10 ± 0.02
	40-49 yrs	10.79 ± 0.39	11.32 ± 0.39	1.08 ± 0.04	1.10 ± 0.19	0.14 ± 0.04

*The accuracy in comparison with groups zone of ecological disaster, $p < 0.001$.

peroxidation (LPO), since LPO can be used as a marker of pathological changes in the ejaculate.

The aim of the study was to evaluate the state of oxidative metabolism in the germ cells of men of reproductive age living in areas of environmental catastrophe Aral Sea region.

Materials and Methods

There were studied 486 men, living at Aiteke-Bi village and city Aralsk of Kyzylorda region that had been divided on three age groups: 18-29 yrs, 30-39 yrs, and 40-49 yrs. The sperm of studied men was chosen as main research material.

To assess the state of oxidative metabolism in germ cells, primary, total primary, secondary, and total end-products of lipid peroxidation were determined.

Determination of conjugated diene conjugates (DC) and the cetodienes (CD) in the semen on the unified method by Ushkalov and Kadochnikov [7]. Diene conjugates were measured by photometrical method in the ultraviolet rays at a wavelength of 232 nm, cetodienes – at 268 nm and expressed in units/ml.

To determine the total primary and secondary catabolism of total lipid peroxidation and Schiff bases, methodological procedure of Lviv *et al.* was used [8].

Statistical analysis was done using programs STATISTICA 6.0 and BIostatistica 4.03 [9].

Results and Discussion

To assess the nature of the violations at the complex impact of negative factors in the region living in areas of ecological disaster, the state of lipid peroxidation and antioxidant status in the semen of men of different age groups was analyzed. From the literature, it is known that under conditions of prolonged exposure to adverse environmental factors on the reproductive system is

disturbed state of peroxidation. Our results are presented in Table 1.

From Table 1, it follows that men living in the zone of ecological catastrophe observed synchronous activation of free radical oxidation, as evidenced by the increase in the level of diene conjugates, cetodienes, total primary, secondary, and end products is especially pronounced among men in the age group 40-49 yrs old.

Conclusion

It is known that in the amplification of a free-radical processes radicals with high reactivity can react with lipids, proteins, nucleic acids, occurring as a result of destructive processes leading to the appearance of lipid oxidation products [10].

Thus, our studies have shown that prolonged exposure to toxicants in the ejaculate of men of different age groups there are violations of lipid peroxidation are different degrees of accumulation catabolism.

In our opinion, dustproof, salt aerosols and excessive background radiation in the areas of the Aral Sea region induce violations of lipid peroxidation in spermatozoa, these changes are mediated through reactive capable catabolizes, of lipid peroxidation cascade that promotes the development of oxidative stress in cells [11].

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