Changes in Erythrocytes membranes Stability in Rats Poisoned with 2,4-DA Herbicide in Experimental Conditions

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1. INTRODUCTION

At present herbicides manufactured on the bases of 2,4 dichlorphenoxyacetic acid (2,4-D) are widely used in agriculture.In the process of their manufacturing and use highly toxic and harmful for man's health dioxins and other chloridated aromatic compounds accumulate in the environment and pollute it. The situation is aggravated by the violation of safety engineering and accidents at the chemical enterprises.Dioxins and 2,4-D derivatives exercise promounced toxity on man's organs,tissues and functional systems causing all kinds of metabolism impairments,cancerous,teratogenic and mutant changes(1,2,3,4,6,8,9,10).

The cellular plasmatic membrane is one of the first cell biosubstrats to come into contact with toxic substances.There is no available information concerning 2,4-D effect on cellular membranes.We consider the erythrocyte membrane a convenient model for the study of the cellular membrane.The present paper considers the effect of amino salt of 2,4-dichlorphenoxiacetic acid (2,4-DA) toxity on erythrocyte membrane in experiment.

2. MATERIALS and METHODS

A single intragastric administration of 2,4-DA herbicide in ½ LD50,1/ 20 LD50 and 1/200 LD50 doses caused an acute poisoning in the rats.The investigations were carried out in 24 hours following the poisoning.Chronic poisoning with 2,4-DA in the experimental animals was caused by daily per os administration of the herbicide in 1/50 LD50,1/500 LD50 and 1/5000 LD50 doses during 30 days (the total dose made up ½ LD50,1/20 LD50 and 1/200 LD50).The animals were decapitated,heparinizated blood was centrifuged at 2000 g to isolate the plasma.The erythrocytes were washed in the isotonic solution of sodium chloride.

Latent changes in the erythrocyte membrane structure were revealed by determination of erythrocytes osmotic resistance (EOR) and their stability to H + -ions effect. The erythrocytes osmotic resistance (EOR) was determined with Waugh and Asherman (13) method modified by N.A.Vasilevskaya (12) and Cohen (5) evaluating hemolyses degree in series of sodium chloride hypotonic solutions of various concentration.The changes in the erythrocytes membranes stability to the effect of H+ -ions were evaluated by means of acidic erythrogramms with Gitelzon and Terskov (7);the method

consisting in recording erythrocytes acidic hemolyses effected by 0,004 N hydrochloric acid solution.Free - radical processes of lypoperoxidation which occur in membrane structures are regarded to be an important factor determining their stability.In this connection we determined the content of malon dialdehyde, end lypoperoxidation product in erythrocytes using colour reaction with thiobarbituric acid (11).

3. RESULTS and DISCUSSION

A distinct decrease of erythrocyte membranes stability to the osmotic forces action was observed in case of acute poisoning in rats with 2,4-DA herbicide injection at the dose of ½ LD50,resulting in distinct EOR curve shift to the right,resistens decrease as compared to the controls.The EOR decrease was noted in chronic poisoning with 2,4-DA in 30 days following the injection of the total dose of ½ LD50.The degree of erythrocyte mildcellular fragility (MCF) (causing 50% hemolysis in sodium chloride concentration) after the injection of 2,4-DA at the dose of ½ LD50 increased by 27% in acute poisoning and 18 % in chronic as comprated to the controls,the lower doses of 2,4-DA (1/20 LD50 and 1/200 LD50) failed to cause distinct EOR changes either in acute or chronic effect.The similar decrease of erythrocyte membranes stability to the H+ -ions effect was observed in acute poisoning with 2,4-DA at the dose of ½ LD50 causing acidic erythrogramms shift to the left as compared to the controls;shortening of erythrogramm base width and reduction of hemolysis duration.Erythrocyte membrane acidic instability developed in case of chronic poisoning with 2,4-DA,not only following the injection of ½ LD50 but 10 times lower total dose of 1/20LD50 as well.Thus,the acidic erythrogramms method proved to be a more sensittive test for revealing latent erythrocyte membranes changes effected with 2,4-DA.

The study of malon dialdehyd content in erythrocytes revealed distinct increase in this product in acute and chronic herbicide poisoning with ½ LD50 and 1/20 LD50 that suggests lipoperoxidation process increase in erythrocyte membranes structures effected with 2,4-DA .The injection of 1/20 LD50 showed no distinct effect on lipoperoxidation intensity in erythrocytes.Lipoperoxidation intensity appears to be an important pathogenetic factor in erythrocytes membrane instability in acute and chronic poisoning with 2,4-DA.

4. REFERENCES

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