

Influence of Ecotoxics on Reproductive Health of Women Living in Region with Developed Chemical Industry

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Chemical agents (ecotoxics) of industrial production renders unfavourable influence on public health⁴⁾ and reproductive function¹⁾. Anthropogenic environmental factors cause dysfunction of endocrine, immune, haemopoietic and other systems¹⁾. Newborns and pregnant women are the most sensitive parts of population²⁾. Ecotoxics are complicating pregnancy, delivery and perinatal development³⁾.

Ufa is a city with well developed chemical and oil industries. The factories in Ufa are polluting soil, water and air with big amount of phenols, dioxins and related compounds. In this situation the immune system is one of the weakest points in the human body.

The purpose of this work was to study the complex influence of dioxins and other organic substances polluting the environment in Ufa on the reproductive function of women, course of pregnancy and infants' state.

Methods. As a marker of unfavourable dioxins influence we have studied the immune status of pregnant women and newborns. The tested group included 146 women with mature pregnancy living in Ufa. Fifty one women living in rural areas without high concentrations of dioxins in their environment were taken as controls. We counted absolute and relative quantity of lymphocytes, T- and B- lymphocytes, determined the levels of circulating immune complexes and complement, concentrations of Ig A, Ig M and Ig G in blood serum. We determined phagocytic indexes (Fi) and phagocytic numbers (Fc), NBT - tests for estimation of the activity of phagocytes. Also we used a cytotoxic method with monoclonal antibodies for the study of T - helpers (CD₄), T - suppressers (CD₈) and immunoregulating index (CD₄/CD₈).

We prognosed fetus' condition on the eve of delivery using Fischers' scale and infants' conditions by Apgar score on the 1st and the 5th minutes.

Results and Discussion. The average age and the anamnestic facts in both groups had not significant differences. The risk of premature delivery in tested group (26,7%) was higher than in controls (7,8%, X² Test p < 0,05). The states of a fetuses calculated using Fischer's score in the main group were worse than in controls (6,60 ± 0,10 and 7,27 ± 0,15 - p < 0,001).

Dioxin '97, Indianapolis, Indiana, USA

The decreased absolute ($1,63 \pm 0,05$) and relative ($23,69 \pm 0,74$) numbers of lymphocytes were found in the tested group in comparison with controls ($2,08 \pm 0,13 - p < 0,01$ and $28,02 \pm 1,28 - p < 0,05$ accordingly).

Table I. The state of cell-mediated immunity.

	Lymphocytes (total)		T - lymphocytes	
	$\times 10^9/l$	%	$\times 10^9/l$	%
TESTED GROUP	$1,63 \pm 0,05$	$23,69 \pm 0,74$	$1,04 \pm 0,04$	$62,52 \pm 1,46$
CONTROLS	$2,08 \pm 0,13$	$28,02 \pm 1,28$	$1,61 \pm 0,1$	$69,67 \pm 1,45$
P	$< 0,01$	$< 0,05$	$< 0,001$	$< 0,01$

The numbers of T - lymphocytes ($1,04 \pm 0,04$ and $62,52 \pm 1,46$) in the main group were also lower than in controls ($1,61 \pm 0,1 - p < 0,001$ and $69,67 \pm 1,45 - p < 0,01$ accordingly).

The T -helpers / T -suppressers rates did not differ significantly in both groups ($1,35 \pm 0,03$ -in tested group and $1,30 \pm 0,30$ - in controls, $p > 0,05$).

Table II. The state of humoral immunity.

	Ig A (g/l)	Ig M (g/l)	Ig G (g/l)	B - lymphocytes ($\times 10^9/l$)
TESTED GROUP	$1,83 \pm 0,06$	$1,52 \pm 0,08$	$9,48 \pm 0,4$	$0,12 \pm 0,02$
CONTROLS	$2,1 \pm 0,13$	$2,08 \pm 0,18$	$13,4 \pm 0,74$	$0,14 \pm 0,02$
P	$> 0,05$	$< 0,05$	$< 0,001$	$> 0,05$

Concentrations of Ig G ($9,48 \pm 0,4$) and Ig M ($1,52 \pm 0,08$) were significantly lower in the tested group in comparison with controls ($13,4 \pm 0,74 - p < 0,001$ and $2,08 \pm 0,18 - p < 0,05$ accordingly).

The tests of the activity of phagocytosis had not reliable distinctions. The results of this tests are presented in the table below.

Table III. Phagocytic activity.

	Fi (%)	Fc	HBT - Test
TESTED GROUP	$47,74 \pm 1,37$	$6,01 \pm 0,22$	$12,84 \pm 0,45$
CONTROLS	$56,56 \pm 10,64$	$6,32 \pm 0,37$	$13,71 \pm 0,84$
P	$> 0,05$	$> 0,05$	$> 0,05$

The levels of the circulating immune complexes were higher in women living in Ufa ($36,01 \pm 3,9$) than in control group ($21,01 \pm 1,3 - p < 0,05$), but the levels of complement were lower in tested group ($66,78 \pm 2,67$) in comparison with control group ($72,52 \pm 3,09 - p > 0,05$). Possibly, the complement is spent on the creation of immune complex in principal group.

As shown in Fig.1 Apgar scores at the 1st and the 5th minutes had significant differences between two groups: at the 1st minute it was lower in tested group ($6,34 \pm 0,10$) than in controls ($6,74 \pm 0,14 - p < 0,05$). And on the 5th minute also there were reliable distinctions in both groups ($7,54 \pm 0,06$ in tested group and $7,76 \pm 0,09$ - in controls, $p < 0,05$).

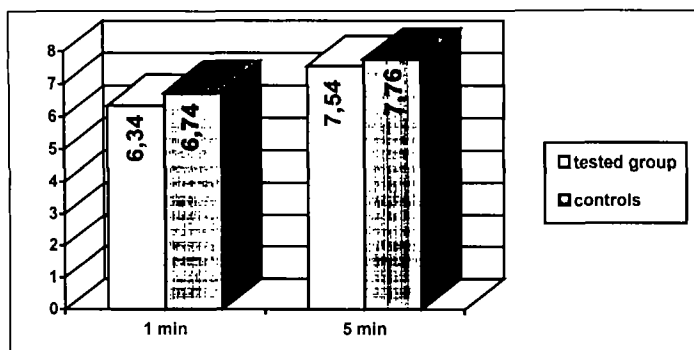


Fig. 1. Apgar scores on the 1st and 5th minutes.

The levels of immunoglobulins in blood serum of infants were different as well. Concentrations of Ig G in tested group were lower than in controls and levels of Ig A were higher in comparison with control group, but the difference was not significant.

Conclusions. The industrial ecotoxicants cause significant changes in the organism of pregnant women living in Ufa: the increasing of complications of pregnancy and delivery, alteration of their immune system state. The homeostasis in the system "mother - placenta - fetus" is breaking.

Our evaluation of immunologic status of pregnant women and infants is a reliable criteria of unfavourable influence of antropogenic factors upon a human organism.

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