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Epidemiology of reproductive function of women living in a city with well developed chemical industry

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The indices of population's reproduction are very important criteria of public health and ecological situation in a region. The epidemiological analysis of women's reproductive function indices in regions with different environment allows to determine their dynamics, developmental tendency, linkage of specific indices with environmental factors.

One of the most significant factors influencing on the reproductive function is environmental pollution with industrial ecotoxins.

Bashkortostan Republic (BR) is included into a group of Russian territories famous for unfavourable natural factors (local endemic goitre) and a big number of oil, gas, sulphur, copper and other natural sources. That is why chemical and oil industries are well developed in big cities (Ufa, Sterlitamak, Salavat, etc.) of BR. The factories in these industrial cities are very dangerous pollutants for nearby territories and aquatories of our republic. Huge industrial accidents at the chemical factory in Ufa in the 90-s caused an enormous pollution of soil, water and air with big amounts of phenols, dioxins and related compounds. The most sensitive to ecotoxins parts of population are risk-groups such as children and women. Anthropogenic environmental factors cause dysfunction of endocrine, immune, haemopoietic and other systems in these groups. These dysfunctionings in a fertile-age woman's body are complicating pregnancy and delivery, perinatal development and define the health of newborns and children populations in this region.

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.

Methods. A comparative retrospective (1990 - 1994) analysis of the indices concerning pregnancies and deliveries in women living in the capital of BR Ufa has been done before and after the accident at "Chimprom" chemical factory when a big amount of dioxins were thrown into the environment. Also we have studied these indices in women living in ecologically polluted areas but without dioxins (industrial cities of BR - Blagoveshensk, Beloretsk, Meleuz, Neftekamsk, Sterlitamak, Seebuy).

As a marker of unfavourable dioxins' influence we have studied the immune status of pregnant women. We counted the quantity of T- and B- lymphocytes, determined the levels of circulating immune complexes, concentrations of Ig A, Ig M and Ig G in blood serum, phagocytosis and NBT-tests, also we use a cytotoxic method with monoclonal antibodies for the study of T-helpers (CD-4), T-suppressers (CD-8) and B-lymphocytes (CD-22).

Results and Discussion. In the city of Ufa after the accident (region of ecological trouble) for the last 4 years we have detected the significant growth of pregnant women's morbidity with anemia (3.4 times) and pyelonephritis (1.5 times). The rate of pregnancy complications including severe forms increased up to 16.0%. The rate of normal deliveries came down to 8.6% (3.2 times). The birth-rate decreased twice. The rate of premature deliveries increased from 4.0% up to 5.5%. The rate of spontaneous abortions increased from 4.0% up to 6.8%. We also register the increasing rate of abortions caused by medical indications.

The tendencies for increasing of total morbidity, rate of complicated pregnancies and deliveries were registered in pregnant women both in Ufa and in the regions of high ecological risk but without a direct dioxins' influence. However the intensiveness-curve of their growth was more gently sloping and the indices of reproductive function in women were much better than in Ufa. For the period of study in the group being tested we have registered the increasing rates of pyelonephritis (1.2 times) and anemia (1.5 times). The rate of complications of pregnancy grew up 1.2 times, the rate of premature deliveries increased from 3.9% up to 4.0%.

The increasing of morbidity of women and complications of pregnancies caused the decreasing of the rate of normal deliveries from 52.7% to 27.0%. The birth rate became 37.6% lower. The spontaneous abortions rate went up from 4.0% to 6.1%.

Our study of immune status of women has been performed in 4 years after the ecological accident in Ufa. The first group of study included 50 women with mature pregnancies living in Ufa. The control group consisted of 40 women living in regions with high ecological risk but without high concentrations of dioxins in their environment.

The decreased number of lymphocytes was found in the tested group (1.78 ± 0.36) in comparison with controls (1.86 ± 0.28) ($p < 0.05$). The numbers of T- (1.18 ± 0.15) and B-lymphocytes (0.12 ± 0.05) were also lower than in controls (1.33 ± 0.12 - $p < 0.05$ and 0.14 ± 0.04 - $p < 0.05$ accordingly).

	Lymphocytes ($\times 10^9/\text{l}$)	T-lymphocytes ($\times 10^9/\text{l}$)	B-lymphocytes ($\times 10^9/\text{l}$)
TESTED GROUP	1.78 ± 0.36	1.18 ± 0.15	0.12 ± 0.05
CONTROLS	1.86 ± 0.28	1.33 ± 0.12	0.14 ± 0.04
P	< 0.05	< 0.05	< 0.05

The T-helper/T-suppressers rates were different as well. In women living in Ufa it was 1.35 ± 0.06 , in control-group it was 1.28 ± 0.05 ($p < 0.05$). This testifies the possibility of compensatory activation of T-helpers' activity in the tested group.

The indices of phagocytosis did not differ significantly. The indices of NBT tests in Ufa-group were 14.5 ± 1.12 and in controls - 14.6 ± 1.11 ($p > 0.05$).

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	T-helper / T-suppressors	NBT - test
TESTED GROUP	1.35 + 0.06	14.5 + 1.12
CONTROLS	1.28 + 0.05	14.6 + 1.11
P	< 0.05	> 0.05

Concentrations of Ig G were significantly lower in the tested group than in the control-group). The similar phenomenon was found comparing these groups according to Ig A and Ig M concentrations. The results are presented in the table below:

	Ig A (g/l)	Ig M (g/l)	Ig G (g/l)
TESTED GROUP	2.2 + 0.3	1.7 + 0.1	11.1 + 0.9
CONTROLS	2.36 + 0.3	4.53 + 0.3	11.6 + 1.2
P	< 0.05	< 0.05	< 0.05

Conclusions. The big emergency dioxins pollution of the environment has caused the significant changes for worse in the health of women living in Ufa, the increasing of the complications-rates of pregnancies and deliveries, aggravation of their immune system's state.

Our evaluation of epidemiology of reproductive functions in women living in the region of ecological catastrophe is a reliable criteria of unfavourable complex influence of dioxins and other antropogenic factors upon a human organism. It should be taken in consideration while managing ecosystems and public health.