POISONINGS OF THE CHILDREN BY ORGANOCHLORINE PESTICIDES

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Introduction

First of all the scale usage and production of such persistent organic pollutants, as organochlorine pesticides (OCPs), Influences health of the children. The children are subject to pesticides influence together with the adults, however their sensitivity to this factor is much higher. The risk of a poisoning by various pesticides is expanded not only to the children, connected to their usage and production by and large, but also on those, who is not connected with them in general. In former USSR the problem of dangerous pesticides influence on the children and their mothers was examined time and again, however this information is not practically accessible even for specialists[1-11].

The children receive the pesticides burden by several ways - from a mother through placenta and breast milk, through a polluted environment, and also as inherited genetic distortions.

Pregnancy and childbirth

We shall inform some results of special study of pesticides influence on pregnancy and childbirth.

DDT penetrates through placental barrier. Study of DDT influence on current of pregnancy and childbirth has shown that in subcutaneous-fatty tissue of stillborn children serious quantities of DDT + DDE[1-3] were found out. An average content of DDT in foetus subcutaneous-fatty tissue (3.1 ppm) poorly differed from those in subcutaneous-fatty tissue of the adult people (4.33 ppm)[1]. In liver of the stillborn children the DDT concentration was to average 0.82 ppm[2], and in subcutaneous-fatty tissue it reached up to 1.5 ppm[3].

Hexachlorocyclohexane (HCH) also overcomes placental barrier[4,5]. It is clear, in particular, from data of researches (1970-1980) of large group of women recently confined, which could have contact only with HCH[4].

It is known also about transplacental transition of herbicide 2,4-D[6].

Pathology of pregnancy, premature and pathological childbirth arose mostly at the women in breast milk of which DDT was found out. These mothers more often than other gave rise to children of small weight and prematurely born (26.5 ±2.7%; the control - 13.1±3.7%). All cases of birth of the children with defects of development concerned to group of the women, in breast milk of which was found out DDT[1].

The expectant mothers, in blood of whom HCH was found out, had general frequency of complications of pregnancy almost in 1.5 time above, than those, for whom this insecticide was not find (78.3% and 58.4%, accordingly). The spontaneous abortions till 12 weeks had happened twice more often for the women with HCH in blood, than without it (7.5% and 3.4%).

Presence OCPs in organism of expectant mothers and foetus results in disturbance of immunologic reactivity and albuminous metabolism[7], and also of hormonal status[4].

The clear distinctions were revealed also after childbirth. When HCH was found out in women blood, percent fetal asphyxia (12.0%) is twice more, than for the women without HCH. For women, in which blood HCH was found out, complications of post-natal period were in 2.5 times more often, than for women without HCH (52.4% and 20.8%, accordingly)[4].

Below there are results of ten-year study of pathology of the 920 pregnant working women, participating in production of group 2,4-D herbicides on plant "Khimprom" (Ufa, Russia)[6]:

- Toxicosis of the second half of pregnancy - 21.7% (control - 4.05%),
- Premature childbirth - 17.4% (5.4%),
- Natural abortions - 5.5% (1.8%).

Accordingly, the result of childbirth of the women engaged on production of the 2,4-D group herbicides was characterized by inherent abnormal development of a foetus (4.4% at 0.8% in the control; the nomenclature of anomalies: hydrocephaly, microcephaly, cleft lip etc), by increased frequency of fetal asphyxia (10.0% at 5.5% in the control) etc[6].

Breast milk

The accumulation OCPs in the women organism even at a background concentration level can be dangerous for newborn because of their bioconcentration in breast milk. After the birth children continue to receive OCPs through milk.

On the whole the λ-HCH concentration in blood of newborns appears three times above, than in mother's[5]. In newborn blood was revealed the predominance of DDE and β-HCH - metabolites, typical just for parent milk. The daily average consumption of γ-HCH and DDT derivatives by newborns with breast milk of mothers, even not engaged on these insecticides, in several cases exceeded the conditionally allowable rules FAO/WHO[8] in 3-5 times.

Heredity

At an extensive statistical material in Armenia (5550 boys and 5496 girls) it was shown a serious deterioration of indices of physical development of rural newborns with growth of pesticides burden. The deterioration of children's physical development is especially significant in those families, where the parents had professional contact with pesticides. For the 194 armenian boys and 159 girls it was shown, that in all these families without exception the children lag behind in physical development the children, whose the parents had no contacts with pesticides. The most lag is in cases, when both parents were engaged on pesticides, a little bit less, when contacts had fathers, and is the least expressed in case of mother's contacts[9].

Influence of the environment

The influence of environmental contamination by OCPs on children's health can be rather correctly revealed on an example of newborns. They are not especially protected against "pesticide's aggression" because their systems of detoxication of extraneous chemical substances are still undeveloped.

For newborns was shown the existence of direct dependence between general pesticide burden on particular territory and primary morbidity[5]. This correlation was tracked at those territories of Ukraine, where the volumes of pesticides usage were not extreme and such a correlation for other age groups is not yet revealed. Among various classes pesticides the most influential is OCPs[5].

Study of a children's mortality in Armenian regions with various levels of pesticides usage shows, that the mortality of the children up to 1 year age directly reflects the pesticide burden (data of 1980-1984)[9].

In 1972-1985-th were received data on influence of HCH on the course and result of pregnancy at numerous group of the women of Samarkand area (Uzbekistan)[4].

The same concerns to the children of Uzbekistan, who had viral hepatitis A in regions of large-scale pesticide usage at cultivation of cotton (1958-1976; Narpaii district of Samarkand area; the pesticide burden was 123.7 kg/hectar). Contamination of the children's habitat was characterized by the following data. In 1968-1974-th the contents of DDT and HCH had reached in soil 3.2 ppm and 10.8 ppm, and in water-supply - up to 2.7 mg/l and 2.9 mg/l, accordingly. The quantities DDT in onion, potatoes and carrots reached 14.8 ppm. The contamination of atmospheric air in settlements at 100 m from fields was x1900 (excess of hygienic standard)[10].

The clinical picture of hepatitis A of the children group from this region had heavy peculiarities (all of them lived in 100-300 m near processable pesticides of fields; in control region cotton was not cultivated, and pesticides were not found out as in environment so in food)[10]:

- larger duration of icteric period - 32 days (control - 22.4 days),
- larger liver increase, than in control group,
- more often lesion of nervous and vascular systems (in 1.5-2 time in comparison with the control),
- more often supervision of mixed syndrome (45% against 12.6% in the control),
- more often picture of illness in the middleheavy and heavy form.

The children's health was investigated in Saljan district of Azerbaijan - zone of intensive OCPs usage, where OCPs amounts received by the organism in 7.7 times exceeded the hygienic standards. The pesticide influence on the health was established for all age groups of children. The most full it is displayed among the children in the age of up to 1 year age and during their pubescence (11-14 years). According to statistics it is displayed in[11]:

- growth of number of lesions of endocrine system, metabolism, nervous system on the average in 3.1 times for children till 15 years,
- high prevalence of pathological lesions for children of 8-14 years (in 2.3 time as a whole, on separate classes of illnesses - in 2.0-8.4 time),
- reduction of group of healthy children (in 3.4 time),
- increase of groups of patients with pathological lesions (in 3.3 time).

Conclusions

The women poisonings have a hardest effect for pregnancy and childbirth. Negatively influenced even very low dozes OCPs. It was shown the dependence of embryonal mortality on pesticides concentration in the mother's organism.

The pesticides have a hardest influence on children's health - the least protected part of population.

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