C.5. Risks/Hygiene/ Toxicology

Clinico-biochemical peculiarities of the influence of pesticides upon development of hepatic and gastric diseases in rice-growing farmers at the Priaral region of Kazakhstan

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Introduction

At present, the etiological and pathological aspects of diseases should not be examined without taking into account the ecological factors. Pesticides are one of the most important ecological agents of environmental contamination. The Priaral region is situated around the Aral Sea in the south of Kazakhstan. The concerned region is an agricultural region and its special plant culture is rice. In order to obtain a rich rice harvest, a number of fertilisers were utilised in the period from 1964 till 1993 and a little bit less in the last years. Besides, that region was struck by unfavourable circumstances due to the drying up of the Aral Sea. This process has resulted in the uptake of salty dust out of the Aral Sea for a radius of 300 to 500 km and the increase of mineral salts in the atmospheric moisture, water springs, soil and so on. According to statistical data, the incidence of gastrointestinal diseases among peasants in that region had increased three fold for the last 10 years. At present, some complex measures are taken for the improvement of the complicated ecological situation and the chemical fertilisers' utilisation was reduced with 43.2% since 1998 upward.

The complex of clinico-laboratory, instrumental and toxicological investigations of 485 rice-growing farmers, was carried out. All of them were inhabitants of the Priaral region, which has been under unfavourable ecological circumstances, and had a close contact with carbamite over a period varying from 5 to 20 years. As a control, a group of inhabitants, living at the same location of the same age and sex, who had no labour contact with pesticides, was examined. In comparison to the reference group, the active group of rice-growers underwent the complex influence of climate (high temperature, moisture, insulation) and occupational (dust, noise, vibration) harmful factors.

Methods of investigation

The investigation methods were as follows :

1. General medical investigations
2. Clinico-laboratory (biochemical, immunological)
3. Toxicological (detection of residual amount of pesticide propanide in bile, urea and gastric juice)
4. Load-test for the detection antipiryne's pharmacokenitics in saliva (marker - cytochrome P450)
5. Intragastric pH-metria
6. Clinico-instrumental methods including :

- Radio-nuclide (hepar scanning and hepatography)
- Computer topography with precisional puncture biopsy
- Laparoscopy with precisional puncture biopsy
- Gastric mucous membrane biopsy
- Morphological and morphometrical bio-assays of hepar and stomach

Results of investigation

All of investigated rice-growers suffered from chronic liver and/or stomach diseases. In the reference group, 30.4% had only dyspeptic complaints and some suffered from alcohol- or virus-induced liver diseases or Helicobacter pylori-associated stomach disease.

In all the 100% of the ill rice-growers, the pronounced vegeto-astenic syndrome was diagnosed (in the control group -27.3%). In the clinic picture of chronic liver's diseases the following syndromes were observed to be predominant:

- portal hypertension syndrome (79%);
- hepatomegalia on account of its left lobe (82.45%);
- splenomegalia with hypersplenism symptoms (36.7%)

In the reference group, only the portal hypertension syndrome was observed in 16.2%.

Inhibition of MAO enzymes (67.8%), activation POZ process (77.8%), and disbalance of certain fractions of phospholipides (82.9%) in the main group were discovered. Among a few persons of the reference group, suffering from high active liver disease functional derangement was only observed in 1/3 of the cases. This measurement concerned the main group where liver cells' functional derangement was observed.

The essential significance for gastric diseases in rice-growers had the effects of atrophic gastritis (73.84% compared to 42.8% in the control group) that accompanied all cases of duodenits, peptic ulcer disease and gastroduodenal reflux. The erosion of gastric mucous membrane in 19.45% (control - 3.7%) cases and the disturbance of acid-forming and acid-neutralising functions in 87.34 % (control - 32.3%) cases were revealed. Significant decrease in gastric secretion, in proportion to increasing contact time with pesticides, was observed. Immunodeficit of T-lymphocytes with disbalance of immuno-regulatory sub-populations was observed, as well as the elevation of the levels of circulating immune complexes and concentration of immunoglobulin classes G, M (88.3 %, control - 44.8%).

In the bile (B and C portions), in the gastric juice and the urea of all the examined rice-growers (100%), a residual amount of propanide was diagnosed ranging from trace levels to different levels. While, in the control group all the results were negative.

Thus, from the results obtained, it can be concluded that the role of agrochemicals is a paramount factor in the development of toxic gastric and hepatic diseases in the Priaral region, where the environmental equilibrium was heavily destroyed due to the prolonged period of use of the carbamate chemicals for plant protection.

Our observations on the rice-growers, who stopped their work about 5-10 years ago, showed that the clinical picture in the after-effect period is characterised by protracted functional nervous system's disturbances, liver fatty degeneration without fibrosis and chronic gastritis with gastric hyposecretion, atrophic changes of stomach's mucous membrane, and adenopathy.

Diagnostics of chronic pesticides' intoxication in the after-effect period of work with pesticides is based on the condition of absence of the other possible reasons for toxic injury of liver, stomach and nervous system.