International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 8, Issue 6
June, 2021
Pages: 173-180

Morphological Aspects of Toxic Liver Damage

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http://dx.doi.org/10.18415/ijmmu.v8i6.2774

Abstract

A scientific study is devoted to the study of morphological and functional changes in the liver after aerosol treatment with insecticides. The authors applied a non-invasive method for the qualitative assessment of functional and morphological changes in the liver. The work was performed in greenhouse conditions in experimental animals, 84 rats and 24 rabbits. A natural indicators system for indicating the chemical composition of bile and the degree of toxic damage to liver cells was revealed.

Keywords: *Morphofunctional; State of the Liver; Toxic Liver Damage*

Introduction

Insecticides are widely used in agriculture to control pests of fruit trees, cereals, vegetables and field crops. Insecticides include substances of various chemical origin. According to Yu.N. Nishanov and M.A.Khamrokulova, some insecticides are used in the form of aqueous suspensions, solutions and aerosols. As a result, they can enter the body not only through the respiratory tract and digestive tract, but also through intact skin.

Numerous authors in their studies have indicated that, for most insecticides, significant resistance in the external environment and thermal stability are characteristic. Due to this, for a long time, after application, they retain their insecticidal activity, toxic properties for humans and animals (Umbetova: 2012).

After aerosol treatment, insecticides intensively accumulate in the organs and tissues of the body rich in lipids (liver, brain, kidneys), as well as in the mucous membranes of the respiratory tract. According to A. Yuldashev, the insecticides that enter the body are metabolized in the liver parenchyma. Metabolites are excreted in feces and urine, tears, sweat, and it is also possible that they are excreted in breast milk in women who are breastfeeding (Khamrakulova: 2016).

At the same time, widely used insecticides differ from each other in chemical structures and physicochemical properties.

According to literature data, insecticides have a general toxic, polytropic effect on the body. Due to the property of selectively accumulating and accumulating in tissues rich in lipids, they are predominantly neurotoxic and hepatotoxic poisons. Their accumulation in parenchymal organs leads to disruption of metabolic processes, primarily oxidation and phosphorylation processes, which is associated with inhibition of the activity of respiratory enzymes: cytochrome oxidase, and a number of dehydrogenases (Umbetova: 2012).

According to M.A. Khamrakulova, under the influence of insecticides, significant disturbances in carbohydrate metabolism and protein synthesis processes occur. They are also referred to as sensitizing substances that can cause the development of allergic reactions. As a result of contact with drugs, the occurrence of occupational bronchial asthma, urticaria, allergic rhinitis, dermatitis, eczema is possible (Ishchenko: 2013).

Works devoted to non-invasive methods for assessing the functional state of organs are of great interest. Where saliva crystallography is considered as a research method based on the ability of a number of crystal-forming substances to form various structures (Botirov: 2018).

But it should be noted that the use of a chemical treatment method is justified in the presence of pests that exceed the economic threshold of harmfulness, taking into account the environmental consequences.

Thus, the effect of insecticides on the morphofunctional state of the liver in dynamics has not been sufficiently studied. To date, according to the results of the analysis of the latest sources, the works devoted to this problem are contradictory and disagreeable.

Purpose of the Study

To study the effect of insecticides Baton EC and Fozalon on morphofunctional changes in liver cells in dynamics.

Material and Methods

The studies were carried out in accordance with the European Convention for the Protection of Vertebrate Animals Used for Experiments or Other Scientific Purposes (Strasbourg, March 18, 1986) ETS N 123. All animals were kept in a vivarium and a laboratory for biomedical research in hygiene at the Research Institute of the State Pedagogical University of the Ministry of Health RUz.

The experiments were carried out on outbred white rats - males weighing 180-220 g, male rabbits weighing 3500-4500 g (outbred), kept in the usual diet of the vivarium. Animals are divided into control and experimental groups. Control animals received an equivalent volume of drinking water, food and were kept in a vivarium. The animals of the experimental group were divided into two groups: the first group was injected intragastrically with Fazolon and Baton EC in the form of a solution at a dose of 1/20 LD50 under normal conditions for 30 days, the second group, together with the intragastric administration of a solution at a dose of 1/20 LD50, were injected with biologically active substances in the usual conditions within 30 days. The animals were sacrificed on the 30th and 60th days from the beginning of the experiment. The liver, blood and urine were taken for the study. Determined along with biochemical parameters of carbohydrate-energy, protein, pigment metabolism and crystallographic forms of biological fluids.

To assess the morphofunctional state of the liver in experimental animals of 1-2-3 groups, the following research methods were used:

1. The functional state of the liver was studied according to the results of clinical and biochemical examinations according to the generally accepted method using an auto-hemoanalyzer VK 6190, as well as using a test strip of lipids in the blood (made in Hungary).

2. The morphostructure of the liver was studied on separate pieces by taking samples from different lobes of the liver. Which were fixed in Carnoy's liquid with subsequent staining of the preparations according to the generally accepted technique (hematoxylin-eosin).

3. The qualitative composition of bile in rabbits was studied by a non-invasive method according to the results of the analysis of crystallograms.

Results and Discussion

Experimental studies were carried out in horticultural conditions. In these fields, 2 groups of experimental animals were kept during the chemical treatment of the bushes, controlling the LD50 of the Baton EC and Fozalona. Under each bush, 4 animals were installed in each cage, a total of 24 rats and 12 rabbits, the second group of experimental animals were kept in the gardens of 24 rats and an insecticide was used for treatment. The third group of experimental animals consisted of 24 rats and 12 rabbits after mixed chemical treatment with feeding with biologically active additives.

All groups of experimental animals were studied by decapitation of animals and taking blood for general and clinical-biochemical analysis, and after dissection of animals, pieces of liver and bile were taken from the bile ducts. And they were subjected to research using the above method. All studied objects were compared with the results of the control group. According to the results of clinical and morphological study of experimental animals on the 7-15th day of poisoning in all groups, in rats, the number of erythrocytes was determined 6.50 ± 0.30 million / mm3, in control animals 6.9 ± 0.28 million / mm3), a decrease in hemoglobin 6 , 9 ± 0.16 g%, in controls 8.5 ± 0.12 g%, total protein 4 ± 0.11 g%, in controls 4.6 ± 0.9 g%, albumin 26.52 ± 0, 34 g / l, in control 29.80 ± 44 g / l. ALT 128 ± 0.56 U / L, in control 68 ± 0.84 U / L. AST 166 ± 0.91 U / L, in control 104 ± 0.60 U / L.

Also, in chronic poisoning on the 45-60th day of poisoning in all groups, the number of erythrocytes was determined 6.00 ± 0.44 million / mm3, in the control 6.9 ± 0.28 million / mm3), a decrease in hemoglobin 6.1 ± 0.22 g% , in controls 8.5 ± 0.12 g%, total protein 3.6 ± 0.21 g%, in controls 4.6 ± 0.9 g%, albumin 22.30 ± 0.38 g / l, controls 29.80 ± 44 g / l, ALT 139 ± 0.82 U / L, control 68 ± 0.84 U / L, AST 174 ± 0.80 U / L, control 104 ± 0.60 U / L l.

According to the results of clinical and morphological study of experimental animals of the second group, it was noted that on the 7-15th day of poisoning, the number of erythrocytes was determined in all groups 6.40 ± 0.28 million / mm3, in the control 6.9 ± 0.28 million / mm3, a decrease in hemoglobin 6, 6 ± 0.22 g%, control 8.5 ± 0.12 g%, total protein 3.4 ± 0.18 g%, control 4.6 ± 0.9 g%, Albumin 24.52 ± 0 , 40 g / l, in the control 29.80 ± 44 g / l. ALT 122 ± 0.48 U / L, in control 68 ± 0.84 U / L. AST 162 ± 0.56 U / L, in control 104 ± 0.60 U / L.

Also, in case of chronic poisoning with an insecticide on the 45-60th day of poisoning, the number of erythrocytes was determined in all groups of 6.12 ± 0.18 million / mm3, in the control 6.9 ± 0.28 million / mm3, a decrease in hemoglobin was 6.2 ± 0.46 g% , in controls 8.5 ± 0.12 g%, total protein 3.2 ± 0.26 g%, in controls 4.6 ± 0.9 g%, Albumin 23.30 ± 0.26 g / l, control 29.80 ± 44 g / l. ALT 132 ±

0.68 U / L, in control 68 ± 0.84 U / L. AST 174 ± 0.66 U / L, in control 104 ± 0.60 U / L. According to the results of clinical and morphological study of experimental animals of the second group, on the 7-15th day of poisoning, the number of erythrocytes was determined in all groups of 6.0 ± 0.24 million / mm3, in the control 6.9 ± 0.28 million / mm3, a decrease in hemoglobin was 6.2 ± 0.36 g%, in controls 8.5 ± 0.12 g%, total protein 3.10 ± 0.46 g%, in controls 4.6 ± 0.9 g%, Albumin 22.46 ± 0.28 g / l, in control 29.80 ± 44 g / l. ALT 134 ± 0.66 U / L, in control 68 ± 0.84 U / L. AST 172 ± 0.54 U / L, in control 104 ± 0.60 U / L.

Also, in case of chronic poisoning with an insecticide on the 45-60th day of poisoning, the number of erythrocytes was determined in all groups of 5.4 ± 0.30 million / mm3, in the control 6.9 ± 0.28 million / mm3, a decrease in hemoglobin was 5.4 ± 0.46 g% , control 8.5 ± 0.12 g%, total protein 3.0 ± 0.24 g%, control 4.6 ± 0.9 g%, Albumin 24.48 ± 0.38 g / l, control 29.80 ± 44 g / l. ALT 114 ± 0.34 U / L, in control 68 ± 0.84 U / L. AST 165 ± 0.70 U / L, in control 104 ± 0.60 U / L.

The histostructure of the liver in experimental animals was studied on the 30th day. The study showed swelling of liver cells (hepatocytes), narrowing of intercellular spaces, uneven expansion of sinusoids, as well as central veins. Where are the signs of a reactive reaction of the liver cells and vessels around it to the effects of the toxic effects of the insecticide revealed? In animals, deeper dystrophic changes in the histostructure of hepatic cells were revealed. In the intercellular structures, there was a rough proliferation of loosened connective tissue, a decrease in the size of hepatocytes. The intercellular bile ducts and sinusoids are narrowed, in some places there were infiltrations in the intercellular spaces.

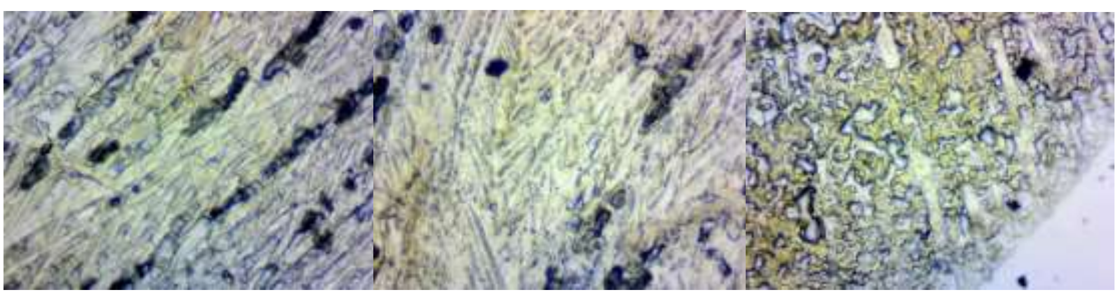
The histostructure of the third group was studied 45-60 days after treatment with an insecticide. In which the appearance of foci of the normal structure of hepatocytes was observed in the liver cells (hepatocytes) against the background of an enhanced dystrophic process. As well as an increase in the size of liver cells, the intercellular space is expanded, in some places there are areas of infiltration, moderate edema of the intercellular tissue, manifestation of the lumen of sinusoids and bile ducts.

The above morphological changes in liver cells after acute and chronic poisoning with insecticides lead to functional impairment of the qualitative composition of bile. The latter affects the crystal formation of bile. The shape and amount of crystal formation of bile in case of insecticide poisoning gives a peculiar quality and shape.

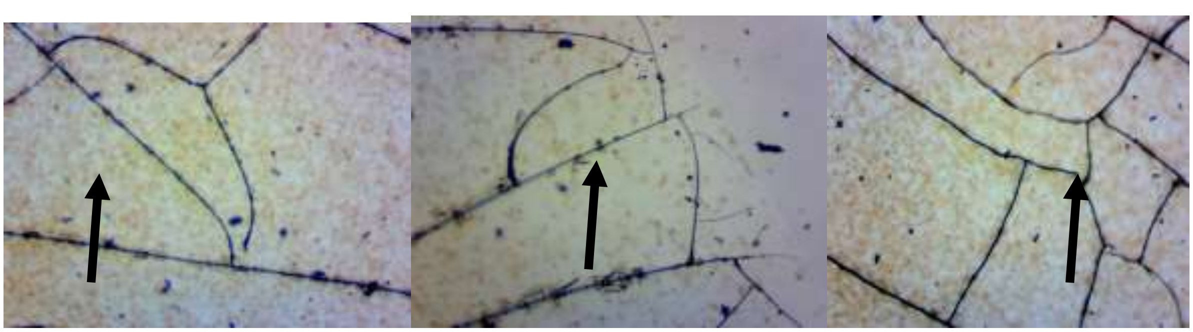
Thus, a non-invasive method for studying the crystallography of bile, urine and blood in rabbits shows that the crystallographic picture looks like with crystallization centers and the safety of the rays. In the study of the considered parameters in healthy animals, it was found that micropreparations of dried animal urine are characterized by a low uniformity of the distribution of structures, which indicates a significant randomness of the process of crystal formation of this biological environment in normal conditions.

If in rats it is possible to assume the destruction of the mineral genesis proper, then in rabbits, on the contrary, the participation of the protein component of the biological environment in the studied feature of crystal formation is possible. This is confirmed by a slight increase in the severity of the marginal zone in the facies of rabbit urine, which indirectly indicates the presence of a protein component in this biosubstrate, with an insignificantly higher level of the parameter ($p > 0.05$), identified with the number of centers of initiation of crystal formation in the dehydrated sample.

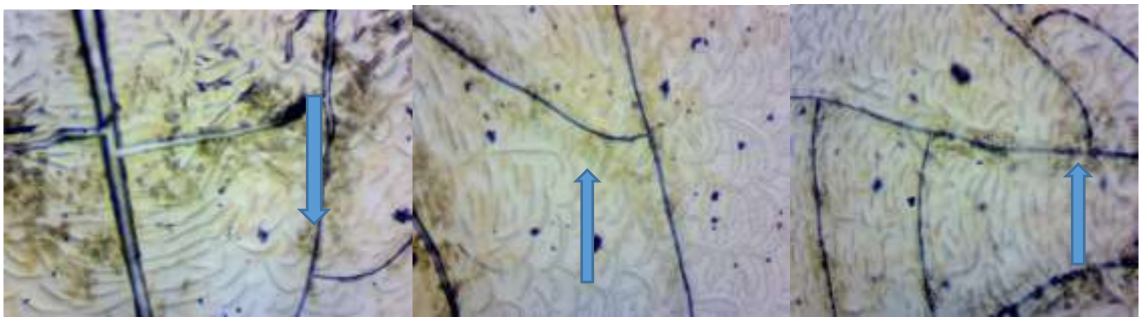
In experimental animals being on the prophylactic use of biologically active substances for the purpose of hepatoprotective action, the crystallography differed from the diseased animals. Where a more vivid picture of a less pronounced protein and mineral component was noted.



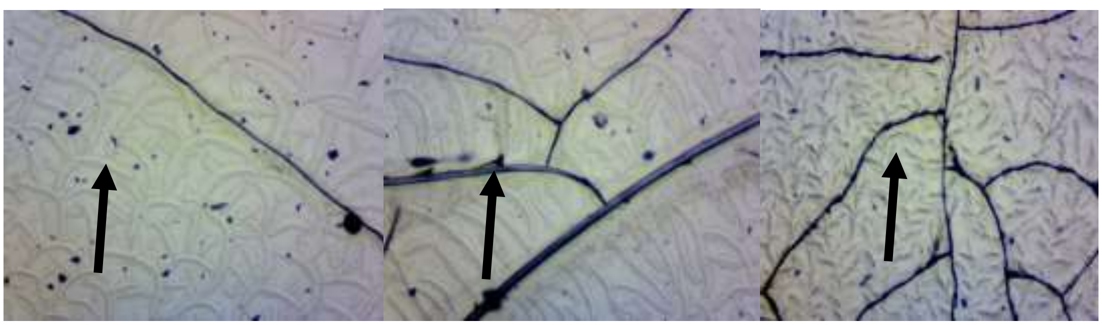
In addition, a crystallographic study, carried out by wedge-shaped dehydration of the blood of experimental animals, showed that symmetrical radial cracks and very few single, three-horny crystals are observed normally.



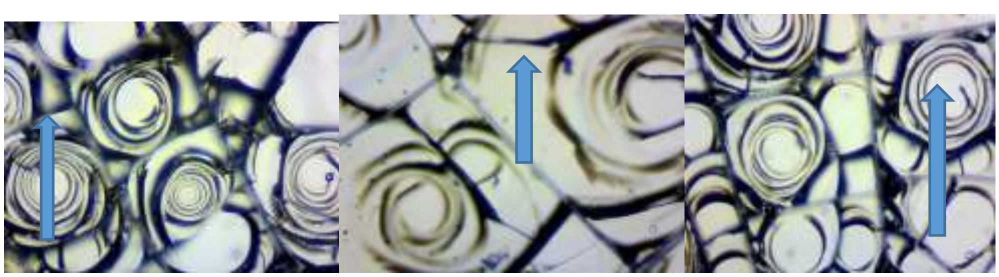
And with liver damage, against the background of toxic hepatitis, due to a violation of protein synthesis, a change in the qualitative composition of bile, a decrease in the branching and radiality of dendrites is noted, as well as a decrease in the frequency of occurrence of three horny dendrites.



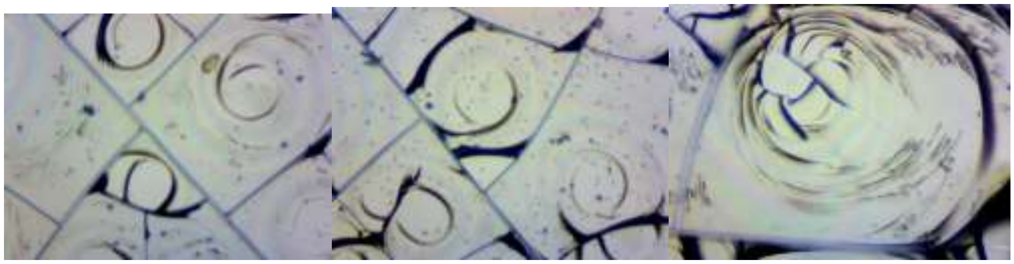
In animals, the seed of which was carried out against the background of preventive measures with the use of biologically active substances, the crystallographic picture of the blood approached the norm.



It should be emphasized that the crystallographic study of the gels of experimental animals gives a characteristic picture. Normally, in healthy rabbits, wedge-shaped dehydration of bile showed that they more often have a silvery, “cord” -type structure, plaques, scallop, ciliate, circular waves of crystals.



When, as with toxic liver damage, on the 30th day, smoothing of the outlines and clarity of crystallographic forms was noted. Disappearance of ciliated crystals and "cord" crystals was noted.



Also, a characteristic crystallographic picture was noted in the study of bile in rabbits, receiving biological active substances. At the same time, the clarity of the boundaries, crystals of the "string" type and ciliary forms of the crystals were preserved.

Thus, when conducting experiments with the use of hepatoxic chemicals in laboratory conditions, to assess the degree of toxic effect on the liver and the body as a whole, a non-invasive diagnostic method is recommended on the 30th day. It is necessary to conduct crystallographic studies of biological fluids (urine, blood, gall in dynamics). The latter is the simplest and most widely available diagnostic method. This may have been caused by a change in the viscosity of the medium, the appearance in it of a large number of products, incomplete metabolism, elements of tissue and cell degradation. Based on the foregoing, it can be assumed that the change in the shape of the crystal and the difference with the control group is a natural system for indicating the chemical composition of bile and the degree of toxic damage to liver cells.

Conclusion

Thus, the use of Baton EC and Fozalon in horticulture in experimental animals leads to inflammatory-reactive, destructive-dystrophic changes, as well as functional disorders of the liver. The crystallographic method for assessing morphofunctional changes in the liver is a publicly available and non-invasive method for natural indication of the degree of damage to hepatocytes. The use of biologically active substances for toxic liver damage prevents the development of irreversible destruction of hepatocytes.

References

Botirov M.T. (2018). Structural spontaneous formation of biological fluids during crystallization and their information about diseases of the organism // Dissertation abstract. Fergana. - 49 p.

Ishchenko O.P., Sobko E.A. (2013). Morphological changes in the mucous membranes of the bronchi in various forms of severe bronchial asthma. // Bulletin. -№49. - pp. 24-29.

Oganesyan E.A., Ponamarenko M.V. (2013). Morphological changes of the trachea, bronchi and lungs in mыshey at dlitelnom vozdeystvii ximicheskix veshchestv, prisutstvuyushchix v vozdushnoy srede pilotiruemyx kosmicheskix apparatov // Rossiyskiy mediko-biologicheskiy vestnik imeni. №3.

Umbetova L.J. (2012). Changing slizistoy obolochki with chronic diseases of the respiratory system in children, projivayushchix v usloviyax zagryazneniya atmosfernogo vozduxa. // Vestnik. KAZN MU. №2. - pp. 132-134.

Khamrakulova M.A., Sadikov A.U., Ubaydullaeva N.F. (2016). Features of the health of the organism of chemical and physical factors and methods of prophylaxis, treatment of biologically active substances // Methodical recommendations. Tashkent. - 15 p.

Yuldashev A.Yu. (1988). Functional morphology slizistoy obolochki tonkoy kishki v razlichnye periody postnatalnogo ontogenesis // Avtoreferat diss. doctor of medical sciences. 14.00.23 / Novosib. med. in-t. - Novosibirsk. - 36 p.

Nishanov U.N., Khamrakulova M.A., Mamasaidov J.T. (2019). The effect of insecticides used in horticulture on the morphofunctional state of the gastrointestinal tract and health // Colloquium-journal. №21 (45), Cz. 1 (Warszawa, Polska). - p. 55.

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