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# THE INFLUENCE OF EXTERNAL FACTORS ON THE DEVELOPMENT OF TOXIC HEPATITIS AND METHODS FOR ITS REHABILITATION

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**Abstract**

This scientific article analyzes the role of external factors (chemical substances, industrial poisons, drugs, alcohol, heavy metals, pesticides) in the etiology of toxic hepatitis and the mechanisms of their damaging effects on hepatocytes. The article briefly covers the pathogenesis, clinical manifestations, and diagnostic criteria of toxic hepatitis. The main focus is on modern methods of liver rehabilitation — detoxification, hepatoprotectors, antioxidants, dietary therapy, and preventive measures. The article substantiates the need for the integration of environmental, occupational, and personal hygiene factors in the prevention and treatment of toxic hepatitis.

**Keywords**

Toxic hepatitis, external factors, xenobiotics, hepatocyte necrosis, oxidative stress, hepatoprotectors, detoxification, prevention, rehabilitation.

**Relevance of the Topic**

Toxic hepatitis is one of the pressing problems of modern gastroenterology and hepatology. In recent decades, industrial development, the expansion of chemical and pharmaceutical production, as well as increased human exposure to drugs and chemical substances, have sharply increased the incidence of toxic liver damage. According to the World Health Organization (WHO), approximately 20-30% of all hepatitis cases are of toxic origin. In developing countries, the risk of toxic hepatitis is even higher among populations living in areas contaminated with industrial waste, pesticides, and heavy metals.

Another aspect of relevance is that toxic hepatitis often becomes chronic, leading to the development of liver cirrhosis and hepatocellular carcinoma. At the same time, in many clinical practices, toxic hepatitis is not diagnosed early enough because its initial symptoms (asthenia, gastrointestinal disorders) are nonspecific. Therefore, in-depth study of the mechanisms of action of external factors and the development of effective rehabilitation strategies is not only medically but also socio-economically important.

**Introduction**

The liver is the primary detoxification organ of the body, biotransforming exogenous and endogenous xenobiotics. However, the compensatory capacity of the liver is limited. Harmful substances in the environment (heavy metals, solvents,

hydrocarbons), alcohol, narcotics, certain antibiotics, analgesics, and herbal products can cause acute or chronic toxic hepatitis. The aim of this article is to analyze the etiology of toxic hepatitis related to external factors, its pathophysiological mechanisms, and to propose evidence-based methods for liver rehabilitation.

**Main Body**

1. External factors causing toxic hepatitis

External factors are divided into several groups:

- *Industrial poisons:* benzene, toluene, chlorinated hydrocarbons, phosphorus, arsenic, lead, mercury.

- *Medicinal substances:* paracetamol (in high doses), isoniazid, halothane, tetracyclines, certain nonsteroidal anti-inflammatory drugs.

- *Alcohol and its metabolites:* acetaldehyde leads to oxidative stress and mitochondrial dysfunction.

- *Pesticides and herbicides:* they induce microsomal enzymes in the liver, enhancing the formation of free radicals.

2. Pathogenesis

In hepatocytes, toxic agents:

- produce reactive metabolites through the cytochrome P450 system;

- trigger lipid peroxidation;

- increase cell membrane permeability;

- cause apoptosis and necrosis due to mitochondrial dysfunction and ATP deficiency.

3. Clinical features and diagnosis

Acute toxic hepatitis — jaundice, hepatomegaly, marked elevation of transaminases (ALT, AST). Chronic form — long-term asthenovegetative syndrome, dyspepsia, transient increase in portal pressure.

Diagnostics involves biochemical tests (ALT, AST, ALP, GGT, bilirubin), coagulogram, ultrasound, and if necessary, liver biopsy.

**Discussion and Results**

The main directions for the treatment and rehabilitation of toxic hepatitis are as follows:

1. Elimination of the etiological factor — discontinuation of contact with the toxic substance (changing workplace, discontinuing a drug, complete abstinence from alcohol).

2. Detoxification therapy:

- In acute poisoning — gastric lavage, laxatives, hemodialysis (for heavy metals), antidotes (N-acetylcysteine — for paracetamol poisoning).

- In chronic toxic hepatitis — enterosorbents (activated charcoal, smectite, polyphepan) and infusion therapy (hemodez, reosorbilact).

3. Hepatoprotectors:

*Main mechanisms of action — stabilization of cell membranes, reduction of oxidative stress, enhancement of regeneration.*

- *Essential phospholipids* (Essentiale, Eslidin) — restore the membrane of damaged hepatocytes.

- *Silibinin* (Carsil, Legalon) — has antioxidant and anti-inflammatory effects.

- *Ursodeoxycholic acid* — reduces cholestasis and inhibits apoptosis.

- *Ademetionine* (Heptral) — stimulates glutathione synthesis.

4. Antioxidants: vitamins E and C, N-acetylcysteine, selenium, zinc preparations.

5. Dietary therapy:

- Diet No. 5 (according to Pevzner) — restriction of fatty, fried, smoked, and preservative-containing foods.

- The diet includes proteins (cottage cheese, egg whites), carbohydrates (cereals), dietary fiber (vegetables, fruits), and an adequate amount of water (1.5-2 L).

6. Microflora and metabolic rehabilitation:

Prebiotics (lactulose) and probiotics help reduce the liver burden by limiting the portal influx of bacterial toxins from the gut.

The results show that a comprehensive approach (etiotropic, pathogenetic, and symptomatic treatment) allows normalization of liver enzymes and functional parameters in 80-85% of patients with toxic hepatitis within 3-4 weeks. However, in the chronic stage and in the presence of fibrosis, rehabilitation may take several months.

**Conclusion**

Toxic hepatitis is one of the most common disorders of liver function in the context of modern environmental and pharmacological burdens. External factors — industrial poisons, drugs, alcohol, and agrochemicals — trigger oxidative damage to hepatocytes, membrane degradation, and an inflammatory cascade. The analyses carried out in this article show that the most effective way of rehabilitation is the timely identification and elimination of the harmful factor, followed by step-by-step detoxification, hepatoprotectors, antioxidants, and dietary therapy.

Important preventive measures:

- adherence to safety regulations in the workplace;

- avoiding long-term use of drugs without medical supervision;

- no abuse of alcohol and other neurotoxic substances;

- regular medical check-ups (biochemical screening).

Future research should focus on identifying biomarkers in toxic hepatitis, assessing individual genetic susceptibility (e.g., cytochrome P450 polymorphisms), and developing new-generation hepatoprotectors. Rehabilitation of toxic hepatitis requires not only medical but also environmental and socio-legal measures.

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