THE SIGNIFICANCE OF LIPID PEROXIDATION IN LIVER TISSUE OF ANIMALS AFFECTED BY ECHINOCOCCOSIS

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ABSTRACT:

Defining physical-chemical feature of cellular membrane while activating free-radical process of lipid peroxidation (LP) for liver echinococcosis and changing cellular under the impact of hyaline. In present work we studied the content of MDA in tissue of 24 rats’ liver which were infected with experimental echinococcosis, 16 of them were unicameral (hydatidous) and 8 in alveolar form. Results of analyses showed that the content of the products of PL in the form of alveolar echinococcosis was almost 1.5 times higher than healthy rats (9,384 and 0.528 nmol/g tissues respectively). The content of MDA in unicameral form of echinococcosis was three times higher in comparison with controlled group (0.384 and 1.06 nmol/l respectively). The taken results proves the increasing forms of LP in tissue of liver in echinococcosis, especially in hydatidous form. As we know, rapid LP processes strengthening follows the change of structural organization of lipid components of membranes with producing hydroperoxidational groups that contribute increase permeable biological membrane and formation of cytological syndrome with the next development of degenerative-necrotic changes in liver tissues. Biochemical researches showed that hyaline consists of protein and polysaccharide parts. Polysaccharide fractions of hyaline consist of apitiglucosamine, hexosmina and rhamnose, which give hyaline antigen character. That is why sent in organism hyaline causes activation of T-lymphocyte cytotoxic, participates in reaction of hyperactive sensibility as immediately as slowly type and contribute to appear the lymphocytic macrophage and plasma cellular infiltration in liver tissues.

I. INTRODUCTION

Familiarization with literature source showed that at echinococcosis main effort of researchers directed to working out and improvement of surgical techniques of deleting echinococcosis bubble and early immunodiagnostics of this illness. Furthermore, significant number of literature dedicated to series of development parasite itself in organism of main and intermediate host. Biochemical shift dedicated to single work on not very unsealed pathogenic base of echinococcosis. Information about studying processes of lipid peroxidation in human and animal under echinococcosis available for us literature could not be found.

One thing should be paid attention is that, stored in recent years data about the changes of physical-chemic features of cellular membrane at activation of free-radical process, lipid peroxidation (LP) allows to consider that strengthening peroxidation of lipid membrane is one of the direct techniques of various agent actions. That is the reason many researches dedicated exactly to the problems of the LP role in various illnesses pathogenesis as the illness of liver. However, in present time the researches of following themes are not enough: the meaning of LP, produced products of changing metabolism liver tissues during the beginning and developing of pathologic

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process liver, dynamic of combining products of LP in liver tissues, micro body of hepatocytes and serum of blood. Especially, there are too small number of researches of clinic condition. In particular, the following theme is not learnt at all: the level of participation process of LP in mechanism of developing injuries on echinococcosis liver

II. MATERIALS AND METHODS

We used the defining method of MDA with the help of thiobarbituric acid for assessing the general content of LP products. On the basis of the method lays the reaction between MDA and second thiobarbituric acid (TBA) which is in 95°C and sour value of pH flows with producing colored trimethine complex. Doing researches showed that the most part of MDA reacting with TBA formed from intermediate products of PL as lipid hydro peroxidation, endoperoxide, prostaglandin-like, bicyclic endoperoxides. In present work we learnt the content of MDA in the tissue of 24 rats’ liver which were infected by experimental echinococcosis, 16 of them in unicameral and 8 alveolar form.

III. RESULTS

Results of analyses showed that the content of PL products in liver of alveolar form echinococcosis were almost 1,5 times higher than in healthy rats’ liver tissue (9,384 and 0,528nmol/l tissues respectively). The content of MDA on unicameral echinococcosis form turn out to be enlarged more than three times in comparison with control group (0,384 and 1,06 nmol/l tissues respectively).Received date proves the enlarged process of PL in liver tissues on echinococcosis, especially in hydatidosis form. It is well known that, rapid strengthening PL processes leads to change in structural organization of lipid components membrane with producing hydroperoxide groups that contribute increasing permeability of biological membrane and formation of cytological syndrome with the following development of degenerated- necrotic changes in liver tissues. Several researches consider that liver insufficiency on overthrow with echinococcosis was the outcome of destroyed parenchymatosis cellular and development of cirrhotic processes in this organ, overthrow of echinococcosis in the process of rise not only directly adjoining to it parenchyma, but also remoted to its tissues. Development of liver sclerosis is connected with toxic action of echinococcosis liquid.[5]. In 1967, A.A.Mozgovoy had already showed that the toxic influence of echinococcosis came from the first day of infecting them and stipulate with absorbing poisonous bubble liquid. I.Ya.Deyneka (1968), while studying histologic changes on echinococcosis liver noted that lobate construction of liver tissues near echinococcosis commonly were destroyed, in some places was being observed atrophy of lobules and overgrowth of connective tissues between them. A.V.Vahidov and co-authors (1987) on morphologic study of human liver biopsies ascertained significant changes in organ also and the level of pathologic changes were directly depended of the echinococcosis tassel size.

So, as the result of echinococcosis destroy, serious structural-functional changes in liver happens. The first data about significant growth of LP products in liver tissues we received, allows judging the role of LP based on origin and development of pathologic process on echinococcosis liver. Our results have theoretical and practical value that specify several pathological mechanisms, which are laying on the basis of origin and development of disease on echinococcosis liver.

Echinococcosis – one of the serious and largely spread human and animal illness. This parasite invasion presents serious medical-social and economic problem form many countries. In recent years, because of carried out scientific researches were created significant premise for solving clinical-diagnostic, pathomorphological questions, epidemiology and treatment of echinococcosis. At the same time, there are no final explanation to pathobiochemical developing mechanisms of echinococcosis in human and animal organism yet. It was revealed that because of oncosphere echinococcosis implantation in organism of intermediate host, developing number of specific and non-specific cooperation. Therefore, we showed that developing in organs and tissues echinococcosis tassel in process of own life activity stimulate the process of lipid peroxidation. Lipid peroxidation products break the wholeness of cellular membrane, heighten their permeability for various connections and make them useless for fulfilling own functions in the end. Therefore, zone of necrosis - round massive cellular infiltration is created around the tassel which is substituting with combining tissue in organ and tissues where echinococcosis tassel is developing, cuticle tegument parasite is being formed having hyaline as a main component. In polysaccharide fraction of hyaline includes carbohydrates as apiti glucosamine, hexosmina and rhamnose. Therefore, injected in organism hyaline leads to strengthening the reaction of T-lymphocytes blast transformation that prove antigenic role in stimulation of lymphocytes. Moreover, hyaline participate in reaction of hyper sensibility of immediate and slow types and contribute to appear lymphocyte-macrophage and
plasma cellular infiltration, activation of cytotoxic T-lymphocytes in liver tissues [6],[13]. Consequently, hyaline tegument indicates the sensitizing action and leads to turning on immunologic mechanism of intermediate host. Between master and parasite develops protective adjustment. Interrelation between master and parasite based on molecular-biologic basement. The master around parasite forms own fibrous tegument as the result of collagen forming activation process. Walls’ thickness of fibrous capsules depend on intensity of immunologic reactions of organism and not often achieve 5 cm and more. The growth of big amount of blood vessels in fibrous capsules supply trophic functions of echinococcosis bubble and long-lasting existence. Moreover, fibrous capsules safely retain the parasite’s body in minimum harmful effect on organs and master’s organism.

Thereby, echinococcosis after injection in organism of intermediate host stimulate the process of lipid peroxidation that contributes to destroy wholeness of cellular membrane and leads to formation of necrosis zone with massive cellular infiltration. In future necrotized tissue subjected to hyalization process. At the same time hyaline like antigen provide sensitizing effect and turn on immunologic mechanism of intermediate host. Activation of immunologic reactions later on stimulates the process of collagen-formation of master’s tissues and forming fibrosis capsules around parasite.

According to our researches, in fibrosis capsule the content of proline is 9,7 times, oxiproline is 2,9 times higher than the content group that shows the collagen-forming activation process of echinococcosis liver. All the stated above, prove the value of lipid peroxidation and gluconeogenesis in formation mechanism of pathologic process on echinococcosis, also the role of hyaline in immunologic process, developing in organism of patient under this pathology.

Despite the fact that echinococcosis is well-known to humanity from ancient times, only in the last decade has enough serious attention been paid to the development of this problem because the damage caused by this helminthiasis to both human health and animal husbandry is very great.

Whereas, the echinococcosis largely spread around the world, the problem of this illness situates in the center of attention of international organization as FAO and WHO and UNEP. They held several meetings dedicated to the question of echinococcosis, worked on the event of scientific researches directed to this disease. In this connection, future development of scientific researches in sphere of echinococcosis, working on questions of pathogenesis, early diagnostics, scientific-proved method of treatment and prophylactics remain the actual task of health protection and veterinary.

It is known that echinococcosis can affect any organ, but often (50-80%) firstly affect liver and lungs (15-20%). Conducted researches [1], [2] revealed that, during the invasion illness destroys the liver’s function characterizing dysproteinemia, bilirubinemia, change in carbohydrate exchange, antitoxic function of organ. During the research of pigment exchange, it was revealed that in order of obturation, parenchymatous jaundice seldom takes place [3],[4]. This indicates that, in addition to the violation of the biliary function of the liver, due to mechanical compression of the bile ducts and hepatocytes, metabolic processes in the liver cells themselves are disturbed. Collagen formation. According to these authors, dysproteinemia is caused by an increase in gamma globulins and a decrease in the level of albumin in the blood serum. The severity of functional liver disorders depends on the prevalence of the process and the presence of complications in echinococcosis. By their many experimental and clinic researches [6] they established that echinococcosis disease leads to serious violation of albuminous exchange. In experimental animals, they showed the presence of hyperproteinemia, dysproteinemia, a decrease in the A / G ratio, the appearance of "C" - reactive protein and a decrease in the content of urea. The appearance of qualitatively new fractions in the zones of slow and fast posttransferins, postalbumin and the first starting peak was found. Along with this, the authors revealed the possibility of early diagnosis of alveococcosis by determining the activity of the enzymes phosphohexoisomerase, aldolase and ketose-1-phosphataldolase in the urine. In addition, the authors obtained data on the content of simple and complex proteins, the activity of a number of enzymes and ceruloplasmin in the blood serum of patients, which can be used as additional criteria for assessing the completeness of recovery and the degree of rehabilitation of echinococcosis patients.

The authors studied the content of electrolytes, histamine and carotene [7],[8] changes of interleykyn 1 activation and interferon in serum in patient’s blood installed regularity characterizing pathobiochemical changes in organism of patient who were suffering from echinococcosis
There is an opinion that the insufficiency of the function of an organ, in particular of the liver, when it is damaged by echinococcosis is a consequence of the destruction of parenchymal cells not only of the parenchyma immediately adjacent to it, but also of tissue distant from the parasite. Some authors [9], [10] associate the oncoming morphofunctional changes mainly with the toxic effect of echinococcal fluid. The authors believe that the toxic effect of echinococcosis appears from the first days of their parasitism and is caused by the absorption of the poisonous fluid of the bladder [1]. A.V. Vakhirëv et al. (1987), by morphological study of liver biopsies, revealed significant changes in the tissue of the organ, and the degree of pathological changes was in direct proportion to the size of the echinococcal cyst. Histological examination of liver pieces in echinococcosis showed atrophy of the hepatic lobules, rearrangement of hepatic trabeculae, proliferation of connective tissue, extensive perivascular fibrosis, and the appearance of areas of granulation tissue [2].

It should be noted that until now the mechanisms of echinococcosis damage to the body have not yet been fully established. As a result of our studies, it was shown that echinococcal cysts developing in organs and tissues stimulate the processes of lipid peroxidation (LPO). If in the alveolar form of echinococcosis the LPO products in the liver tissue increased 1.5 times, then in the hydatid form more than 3 times compared with the group of animals not affected by echinococcosis. The data obtained indicate the activation of highly reactive free radical products. These substances strongly disrupt the integrity of the cell membrane, increase their permeability and, ultimately, from normal, healthy, it turns into a patient, which subsequently leads to the development of degenerative-necrotic changes in the body [11], [12], [14].

In the organs where the echinococcal cyst develops, due to the formation of necrotic tissue, the cuticular membrane of the parasite is formed. Numerous studies have established that the cuticular membrane is formed in the process of hyalinization, therefore, its main component is hyaline [16], [17]. It should be noted that the appearance of gealin-like masses in the liver cells was first outlined by F.W. Mallory in 1911 in the liver of a patient who died as a result of chronic alcoholism. In this regard, F.W. Mallory believed that hyaline bodies (Mallory bodies) are a specific morphological sign of alcoholic liver damage. However, the work of researchers in recent years has shown that these formations are found in other pathological conditions of the organ.

IV. DISCUSSION.

Under an electron microscope, hyaline appears as a limited mass of electron-dense fibers closely associated with ribosomes. Biochemical studies have shown that hyaline consists of protein and polysaccharide parts. The polysaccharide fraction of hyaline consists of acetylglucosamine, hexamine and rhamnose, which impart an antigenic character to hyaline. Therefore, the hyaline introduced into the body activates the cytotoxicity of T-lymphocytes, participates in both immediate and delayed hypersensitivity reactions, and promotes the manifestation of lymphocytic-macrophage and plasma cell infiltration in the liver tissue. Therefore, it must be assumed that in echinococcosis, the hyaline shell of the parasite as an antigen has a sensitizing effect and leads to the activation of the immunological mechanism of the intermediate host. Hyaline is one of the main stimulators of the process of fibrillogenesis in the organ. Perhaps because, with the connection of the immunopathological process and the activation of fibrillogenesis, collagen tissue begins to form around the parasite, which ultimately contributes to the creation of a fibrous capsule. The intensity of the formation of a fibrous capsule depends on the activity of the body's immunological reactions and the processes of collagen formation around the parasite.

V. CONCLUSION.

Thus, our research, observations and analysis of the literature on this issue allows us to conclude that echinococcosis, after being introduced into the body, stimulates the processes of lipid peroxidation, leads to disruption of the integrity of cell membranes, the formation of a zone of necrosis and the formation of hyaline bodies around the parasite. Hyaline, in turn, as an antigen, stimulates immunopathological processes and causes the activation of collagen formation in the host tissue and the formation of a fibrous capsule around the parasite.

REFERENCE LIST


6. J. Kenjetay, A. Allabergenova, T. Aytjanova, K.M. Romashev, B.G. Rojaye, K.Sh. Dosanov Amin acid content of products were fed healthy and ill animals with echinococcosis in comparing aspect. Scientific news of Kazakhstan, 2 (140), 139-146


