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Laboratory Changes in Chronic Alcohol Abusers in Postcovid Syndrome

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ABSTRACT

This article presents the results of a study of blood tests of their patients in a Narcological dispensary in chronic alcohol abusers in Postcovid syndrome. Carbohydratdeficite transferrin has been detected in various devices. The diagnostic importance of using the carbohydrate deficiency transferrin method in chronic alcohol abuse has been shown.

Introduction. Problems with excessive alcohol consumption and the consequences associated with them have reached dangerous levels, and alcohol has become one of the most important health risk factors worldwide [1].

Alcohol consumption leads to illness, injury, disability, and early death, as opposed to other risk factors. In addition to harming their own health, alcohol abuse by the population causes many social problems related to increased violence, increased road damage, etc., which affects people who do not drink alcohol, especially from the immediate vicinity of drinkers [3].

With regular consumption of alcohol, chronic alcoholism develops, which is dangerous to a person's health, causing great harm to society. The spread of chronic alcohol abuse in Russia carries out the task of developing a set of measures aimed at finding a new effective marker for monitoring and assessing the level of alcohol consumption [2].

Modern examination methods make it possible to identify individuals prone to chronic alcohol abuse with high confidence. Among them, methods of diagnostic testing of residents of different social and age groups occupy an important place, which allows you to identify individuals with chronic alcohol load in a timely and early stage, as well as monitor the dynamics of the effectiveness of treatment in people prone to alcohol abuse [5, 6].

There are three components to the diagnosis of chronic alcohol abuse. The first of these is a non - recognition or under-assessment of Alcohol Dependence, the second is overdiagnosis or misinterpretation in the presence of another etiology disease. And the third is the misdiagnosis of the alcohol addiction itself or Form [4].

The misdiagnosis of alcohol dependence is mainly due to the fact that chronic alcohol abuse can have various clinical options - from asymptomatic, latent forms to severe, prognostically unfavorable, accompanied by extremely high mortality [8, 11, 13].

Laboratory signs of alcohol consumption are divided into groups of direct and indirect biomarkers. Biomarkers are characterized by their pathological growth mechanisms, which largely determine their analytical specificity; the dose of alcohol and the duration of its consumption, which are necessary to increase the biomarker concentration; the period of Half-Life (or exchange period) in the human body, and this indicator is very important in assessing the diagnostic significance of the marker. differentiation of chronic abuse and the possibility of early detection of relapse [7, 9, 10].

A specific increase in carbohydrate deficiency transferrin is observed in people who consume at leAST 50-80 g of alcohol for at leAST 7-10 days, which makes it possible to determine the fact of chronic abuse by the laboratory [12, 14]. At the same time, in most patients with liver disease, carbohydrate deficiency transferrin levels remain within normal limits, which distinguish it from ALT and AST indicators.

The relevance of the work consists in the assessment and implementation of an effective mechanism for monitoring and assessing the level of alcohol consumption.

Materials and methods

The diagnostic method used in the study is based on a qualitative and quantitative electrophoretic analysis of a biological marker-serum carbohydrate deficiency transferrin (carbohydrate deficiency transferrin), which reflects chronic alcohol abuse.

The object of the practical part of this work is biochemical blood tests of patients.

Biochemical blood test-a medical analysis that allows you to assess the work of internal organs (liver, kidneys, pancreas, gallbladder, etc.), get information about metabolism (metabolism of lipids, proteins, carbohydrates), determine the need for trace elements. Biochemical blood test indicators play a decisive role in the diagnosis of a number of serious diseases and are widely used in almost all areas of applied medicine. Blood biochemical testing is of particular diagnostic importance in diseases of the heart, liver, kidneys and endocrine system [11-13].

Currently, Research is being carried out on diagnostic signs of alcohol consumption around the world. In laboratory practice, the composition of enzymes (aspartate aminotransferase (AST) and alanine aminotransferase (ALT), synthesized by hepatocytes and without specific signs of alcohol consumption, is studied [14].

For some time after drinking alcohol (less than 12 hours), ethyl alcohol can be detected in biological fluids (blood and urine), which is excreted unchanged in urine, sweat and exhaled air, since the remaining ethanol is absorbed in the stomach and intestines [15-18].

Much of the alcohol absorbed is oxidized in the liver by alcohol dehydrogenase, aldehyde dehydrogenase, and microsomal ethanol oxidizing enzymes to form acetaldehyde, which is a major factor in the development of many pathological conditions associated with alcohol consumption [20]. About 20% of the ethanol entering the body is absorbed in the stomach, the remaining 80% is absorbed by the intestine. Only 5% of ethanol is excreted unchanged in urine, sweat, and exhaled air, where it can be detected within a few hours of consumption.

90-95% of absorbed alcohol is oxidized in the liver using alcohol dehydrogenase, aldehyde dehydrogenase, and microsomal ethanol oxidizing enzymes to form acetaldehyde, which is a major factor in the development of many pathological conditions associated with alcohol consumption [19, 21]. Direct signs of alcohol consumption can be ethyl esters of fatty acids in

the body, breakdown products such as phosphatidylethanol, ethyl glucuronide and ethyl sulfate. In different body fluids, the period of their detection can vary from 8-12 hours to 5-7 days [22, 23]. Currently, direct signs of alcohol consumption are very rarely used in clinical practice.

The group of indirect markers includes various indicators, the analytical characteristics and diagnostic significance of which can vary greatly [24-28].

A quantitative assessment of the levels of "liver enzymes" - aspartate aminotransferase (AST) and alanine aminotransferase (ALT) - is used. Increased aspartate aminotransferase levels are often the first identified indication of hepatocyte response to the effects of drugs and toxic substances. AST and ALT levels increase overall damage to liver cells or the permeability of cell membranes of alcohol and alcohol-free origin. Both enzymes enter the blood when cell membranes are damaged and are present in many tissues. In alcohol abuse, the levels of AST and ALT (The Half-Life is 17 and 47 hours, respectively) rise, but due to very low sensitivity and specificity, these signs cannot be considered as independent indicators of chronic abuse [29].

Gammagglutamyltransferase (GGT) is a membrane glycoprotein (enzyme) that catalyzes the transfer of the gammagglutamil residue to various protein acceptors. The increase in serum GGT levels in response to the consumption of different amounts of alcohol and during different periods of abuse can vary significantly from patient to patient. First of all, GGT is an indicator of chronic consumption of high-dose alcohol, but in alcoholics and alcoholics, but in abusers, if they do not have liver diseases, it remains within the limits of normal values. The Half-Life of GGT lASTs from 14 to 26 days, and the concentration of the enzyme in whey returns to normal 4-5 weeks after stopping alcohol consumption [28].

Ght can increase at an unspecific rate in pancreatic diseases, type II diabetes, obesity, hypertension, myocardial infarction, chronic obstructive pulmonary diseases, and kidney failure [30]. Thus, the main disadvantage of this biomarker is its low specificity.

In general, the traditional indirect alcohol consumption symptoms described above are characterized as cheap, easy to perform, but sufficiently reliable indicators, which have a number of important limitations, lack of sensitivity, associated with diagnostic specificity, and give false positive results in a number of liver diseases that are not associated with alcoholism and when taking certain medications [31-35].

In recent years, a new marker - carbohydrate-deficit transferrin (carbohydrate-deficit transferrin) has become increasingly used in world practice. According to literary sources containing the published results of large multicenter, clinical and examination tests, carbohydrate deficiency transferrin has the best analytical indicators among the available signs of laboratory evaluation of chronic abuse. A specific increase in carbohydrate deficiency transferrin is observed in people who consume at leAST 50-80 g of alcohol for at leAST 7-10 days, which makes it possible to determine the fact of chronic abuse by the laboratory.

At the same time, in most patients with liver disease, carbohydrate deficiency transferrin levels remain within normal limits, which distinguishes it from GGT, ALT and AST indicators. Some chronic liver diseases can lead to false positive results. Nevertheless, according to various studies, this marker demonstrates the highest rates of specificity and sensitivity [36-40].

In Russia, from 2020, new rules for medical examination by drivers and persons who have filed a driver's license will come into force, which will provide an examination for chronic alcohol abuse by detecting a carbohydrate deficiency transferrin marker [41, 42].

Transferrin (TF) is a whey protein synthesized mainly by hepatocytes, the main carrier of iron in the body.

The Transferrin molecule consists of three structural domains: a polypeptide chain, two

independent iron ion binding sites, and two N-glycan complexes. All three domains are characterized by strong variability that ensures significant microheterogenicity of transferrin molecules [43-49].

Of great importance for the diagnosis of chronic alcohol abuse is the variability of transferrin molecules in the structure of N-glycan chains. The N-glycan chains of Transferrin molecules can differ in the degree of branching that produces two, three, and tetraanthene. Each antenna can terminate in a sialic acid molecule with a negative charge. Depending on the number of sialic acid residues associated with carbohydrate chain antennae, up to 9 variants (isoforms) of transferrin from asialo to octasialotransferrin are detected in human blood serum.

The proportion of these serum isoforms is strictly in order and in a healthy person: less than 1,5% for heptasialo-Tf; 1-3% for hexasialo-Tf; 12-18% for pentasialo-Tf; 64-80% for tetrasialo-Tf; 4,5-9% for trisialo-Tf and less than 2,5% for disialo-Tf. Asialo -, monosialo-and octasialotransferrin are usually undetectable or found in negligible concentrations: less than 0,5% for asialo-Tf; less than 0,9% for monosialo-Tf [50].

In chronic alcohol abuse, the glycosylation of transferrin is impaired, which leads to a change in the percentage of its isoforms to an increase in the level of low-level options called carbohydrate deficiency or carbohydrate deficiency transferrin. Currently, and at the initiative of the International Federation of Clinical Chemistry (IFCC), it is customary to classify transferrin asial, monosial and disial-isoforms as carbohydrate deficiency transferrin until the conclusion of the International Standardization Program of carbohydrate deficiency transferrin [51-55].

From the moment the different forms of transferrin were identified, their identification was carried out by different analytical methods. The low analytical properties of this or that method can significantly reduce or completely devalue the diagnostic significance of carbohydrate deficiency transferrin [56-59].

In this regard, the practical use of the carbohydrate deficiency transferrin marker should be carried out only with diagnostic methods, the characteristics of which fully meet the criteria set in their selection.

Currently, a wide range of methods have been developed to determine the level of carbohydrate deficiency transferrin, among which indirect and direct immunonefelometry, high-performance liquid chromatography and capillary electrophoresis methods have been applied practically [60, 61].

Immunonefelometry methods do not allow the complete separation of low-sialed isoforms from high-sialed transferrin isoforms, do not allow the identification of genetic variants of transferrin, which negatively affects the analytical specificity of the marker and increases the risk of false positives [58, 59, 62]. Due to the inefficiency of this approach, immunological methods were excluded from the diagnostic mechanism for evaluating a carbohydrate-deficient transferrin.

Separation methods-high-performance liquid chromatography and capillary electrophoresis-are free of the disadvantages of immunological methods, allowing the separation, visual and quantitative evaluation of carbohydrate-deficient transferrin isoforms both on all carbohydrate-deficient fractions and on disialotransferrin. In addition, separation methods allow the identification of possible genetic variants of transferrin, thereby reducing the risk of misinterpretation of research results [61, 63].

From a practical point of view, the most optimal is carbohydrate deficiency transferrin analyzers with the method of capillary electrophoresis. Currently, the evaluation of carbohydrate deficiency transferr is possible using commercial analyzers from the manufacturers Sebia (Minicap and Capillarys 2 Flex Piercing systems) and Helena Bioscience [69].

The method for determining carbohydrate deficiency transferrin by the V8 analyzer produced by Helena Bioscience has limitations in measuring asialotransferrin fraction, as well as limited functional properties [65, 66, 67].

The Sebia method allows all carbohydrate deficiency fractions to be separated, visualized, and evaluated in general or fractional quantities. Evaluation of the results of carbohydrate-deficit transferrin is carried out in relative units (%carbohydrate-deficit transferrin), which prevents interference by fluctuations in the total concentration of transferrin [64].

The purpose of the study: to identify laboratory changes in chronic alcohol abusers in Postcovid syndrome.

Discussion of results: The diagnosis of SDT is carried out to laboratory confirmation of the fact of chronic alcohol abuse during the registration of patients with alcoholism (a positive result of a carbohydrate deficiency transferrin test), to objectify the control of remission of a patient with alcoholism - negative results of the carbohydrate-deficit transferrin test during the dispensary accounting period: examination for chronic alcohol abuse for workers whose professional activities pose a threat to those around them, carry weapons, manage transport (negative result of carbohydrate-deficit transferrin analysis); when conducting monitoring of alcoholism between middle and higher educational institutions, as well as conducting socio-hygienic monitoring aimed at determining the prevalence residents of the country.

During the studies, the results of 1317 laboratory blood tests of patients between the ages of 13 and 72 for alcohol-containing alcohol abuse in the laboratory were analyzed Samarkand regional Narcological dispensary" for 2021.

Among the total number tested, 844 people (64%) are potentially healthy, while 473 people (36%) are people diagnosed with chronic alcohol consumption.

Among patients with alcoholism, adolescence (13-16 years old) was recorded in 10 people (2,1 %), adolescents (17-24 years old) in 52 people (11 %), maturity (25-54 years old) in 214 people (45.2 %), the elderly (55-72 years old) in 197 people (41,7%). A total of 753 men were examined, of whom 416 were healthy and 337 were ill (44,8% of the men examined), with the majority between the ages of 25 and 54 (154 people or 45,7 %). The number of women examined was only 564, of whom 428 were healthy and 136 had alcoholism (24,1% of the total number of women examined), with the majority between the ages of 25 and 54 (60 people or 44,1%).

Among the patients examined, individuals of mature age often abuse alcohol. In 2020, 1,000 laboratory blood test results of patients were analyzed. Among the total number examined, 869 people (87%) were healthy, 94 (9%) were sick people, and 37 (4%) were included in the "grey zone" (fig. 3, 4).

The test results of patients were distributed according to gender: among men, pathology was found in 51 people (10%), among women – in 43 people (8%).

In the data comparison for two years, a trend of a decrease in the number of individuals with chronic alcohol consumption by 119,9 percent was noted, and the number of people leading a healthy lifestyle is increasing.

In several patients who were in a dispensary diagnosed with alcoholism, biochemical indicators and dynamics of changes in the transferrin value of carbohydrate deficiency were observed; at 3-4 weeks of treatment, carbohydrate deficiency was found to decrease transferrin levels to normal values. An example of a change, decrease, normalization of the transferrin indicator of carbohydrate deficiency in a patient during the period of non-alcohol consumption.

When analyzing the dynamics of changes in the biochemical markers (ALT, AST) of the same patient, it can be seen that over time the concentration of enzymes also decreases (from 101.2 to 80,1 u/l for AST; from 120.6 to 84,1 u/l for ALT), but even after 3-4 weeks these values do not normalize and remain high. The obtained values of the enzymes AST and ALT during this period do not allow confirmation of the patient's complete rejection of alcohol.

On the 1st, 7th, 14th and 21st days of treatment, the data of changes in the transferrin, ALT and AST indicators of carbohydrate deficiency of another patient is shown in Fig. 6 and 7. The findings indicate that with the complete abstinence from alcohol, the patient experiences a decrease in protein concentration, and the carbohydrate deficiency transferrin value returns to normal within 4 weeks. Over time, the concentration of ALT and AST enzymes also decreases (from 134,2 to 64,2 u/l for AST; from 233.1 to 15,4 u/l for ALT). The data obtained and their values make it possible to confirm the complete rejection of alcohol by the patient during this period of time. Thus, comparing biochemical indicators that characterize the reduction in the number of carbohydrate deficiency transferrin values in dynamics and the composition of enzymes, it can be noted that carbohydrate deficiency transferrin data is more informative than markers such as ALT, AST.

Conclusions: The classic signs of determining alcohol consumption are not strictly spikefic and depend on the variation of many factors. Carbohydrate deficiency the sign of transferrin allows you to early identify chronic alcoholism, including forms of latent and latent alcoholism, distinguish it from moderate and occasional alcohol consumption. Thus, the carbohydrate deficiency transferrin marker is a universal diagnostic tool for the implementation of preventive and medico-rehabilitation strategies in diseases of alcohol-containing substance dependence.

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