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CLINICAL AND PATHOGENETIC IMPROVEMENT OF THERAPEUTIC AND PREVENTIVE MEASURES FOR DENTAL PATHOLOGIES IN PATIENTS WITH CHRONIC DIFFUSE LIVER DISEASES

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Abstract. This study is devoted to the assessment of the dental status of the oral cavity and the improvement of treatment effectiveness in patients with chronic diffuse liver diseases (CDLD). The study included 94 patients, who were divided into groups depending on the type of disease: liver fibrosis, chronic hepatitis, and liver cirrhosis. The patients were treated using two different approaches: conventional dental treatment and a comprehensive treatment method developed by the authors, which included the herbal preparation “Rotokan”, vitamin C electrophoresis, and UHF therapy. The results showed that as liver pathology progressed in severity, dental indices such as the Hygiene Index (HI), Papillary-Marginal-Alveolar Index (PMA), and caries intensity index worsened. In the group receiving comprehensive treatment, inflammatory processes in periodontal tissues decreased twice as rapidly, enamel resistance was restored, and the progression of caries intensity was halted. The study scientifically substantiates the high pathogenetic effectiveness of a multidisciplinary approach and physiotherapeutic procedures in patients with CDLD.

Keywords: chronic diffuse liver diseases, liver cirrhosis, chronic hepatitis, periodontium, dental caries, Rotokan, physiotherapy, dental indices.

Relevance. According to WHO statistical data, chronic HCV infection has been confirmed in 71 million people worldwide. The main risk is that 55% to 85% of individuals with acute HCV infection progress to the chronic form, which is a leading cause of liver cirrhosis and the need for liver transplantation [6, 9, 10].

Chronic diffuse liver diseases (CDLD) represent a major medical and social problem worldwide. Their main etiological factors include chronic viral hepatitis B and C, alcoholic liver disease (ALD), and the increasingly prevalent metabolic dysfunction-associated fatty liver disease (MAFLD) [1, 2, 4]. Chronic diffuse liver diseases are characterized by chronic inflammation of the liver parenchyma, necrosis, and progression to liver fibrosis, which ultimately leads to liver cirrhosis and hepatocellular insufficiency [7, 10].

Disease progression is directly associated with a decrease in the protein-synthetic function of the liver, including impaired synthesis of albumin and coagulation factors, disruption of detoxification function with ammonia accumulation, as well as the development of severe complications such as portal hypertension and hemorrhagic syndrome [9].

Epidemiological data indicate an increasing number of patients with CDLD worldwide, especially given that MAFLD, in association with metabolic syndrome, has reached the level of a global pandemic. Chronic viral hepatitis remains one of the most common causes of chronic liver inflammation. According to WHO data, 257 million people worldwide live with chronic HBV infection [3, 5, 8]. Although the probability of chronic HBV infection in adults is less than 5%, in cases of perinatal transmission this rate may reach up to 90%. Chronic hepatitis B is a major factor in the development of cirrhosis and hepatocellular carcinoma [6, 7].

Aim of the Study. The aim of the study was to conduct a comparative analysis of oral hygiene, inflammatory changes in periodontal tissues, and tooth enamel resistance in patients

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with diffuse liver diseases of varying severity, including fibrosis, chronic hepatitis, and liver cirrhosis, as well as to scientifically substantiate the pathogenetic effectiveness of herbal preparations and sequential physiotherapy used in addition to conventional treatment.

Materials and Methods. Taking into account various principles of modern scientific knowledge, we developed a research methodology appropriate to the stated objectives. The planned and conducted studies, based on general scientific and specific methods, were aimed at solving the assigned tasks.

The study included 94 patients with chronic diffuse liver diseases (CDLD). The control group consisted of 23 apparently healthy individuals. Patients with CDLD were divided into three groups according to the type of liver disease.

The patients were further divided into two groups according to the treatment method:

Group I (n = 44): conventional dental treatment.

Group II (n = 50): comprehensive treatment, including Rotokan and physiotherapy in addition to conventional therapy.

Conventional dental treatment included mechanical cleaning of carious cavities and filling with standard restorative materials, standard antiseptic treatment and filling of root canals, professional cleaning of the oral cavity from dental calculus and plaque using conventional methods, and treatment of the gums and periodontal tissues with standard anti-inflammatory ointments, gels such as Metrogyl Denta, and antiseptics.

The comprehensive treatment included, in addition to conventional therapy, the herbal liquid extract Rotokan, composed of chamomile, calendula, and yarrow extracts, as well as physiotherapy consisting of vitamin C electrophoresis and ultra-high-frequency therapy.

Rotokan was not used in its pure form; before use, it was diluted with water. One teaspoon, or 5 ml, of Rotokan was dissolved in one glass, or 200 ml, of warm water. Patients were prescribed rinsing 3–4 times per day for 1–2 minutes. Cotton turundas soaked in the solution were applied to the gingival margin for 15–20 minutes. The water temperature was required to be 35–40°C, since cold water may increase vascular spasm observed in liver pathology, whereas excessively hot water may intensify bleeding. The treatment course lasted 7–10 days, with a total of 5–15 procedures depending on disease severity.

For physiotherapy by electrophoresis, a 5% ascorbic acid solution was used. Cotton turundas soaked in the solution were placed on the gums and connected to the anode-positive pole. The current intensity was 2–5 mA, depending on the individual sensitivity of the patient, up to the sensation of mild tingling. The first procedures started at 10 minutes and were gradually increased to 15–20 minutes. The course consisted of 10–12 procedures performed daily or every other day.

Ultra-high-frequency therapy was performed using an oligothermal dose, producing a mild sensation of warmth. For the jaw area, the power was set at approximately 20–30 W. The procedure was applied bilaterally or transversely to the affected jaw area. The air gap was 1–1.5 cm. The duration was 8–10 minutes, and the course consisted of 5–8 procedures.

To achieve maximum effectiveness in CDLD, it is recommended that these two procedures be performed sequentially on the same day. UHF therapy should be performed first, as it produces heat in the tissues, dilates capillaries, and accelerates blood flow. After UHF therapy, tissue permeability increases, which results in better absorption of ascorbic acid into the deeper layers of the periodontium.

Results and Discussion. The distribution of the 94 patients included in the study according to liver pathology type and applied treatment methods showed that proportionality between the groups was maintained. In particular, among 35 patients with liver fibrosis, 45.7% or 16 patients were included in Group I receiving comprehensive treatment, while 54.3% or 19 patients were assigned to Group II receiving conventional treatment. A similar distribution was observed among respondents diagnosed with chronic hepatitis, 31 patients, and liver cirrhosis, 28 patients.

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In Group I, these patients accounted for 48.3% or 15 patients and 46.4% or 13 patients, respectively, while in Group II they accounted for 51.7% or 16 patients and 53.6% or 15 patients.

Before treatment, dental indices in the study groups worsened in proportion to the severity of liver pathology. In particular, the Hygiene Index was 2.2±0.14 points in patients with liver fibrosis, whereas in patients with liver cirrhosis it increased to 3.6±0.22 points. In Group I, where the developed comprehensive treatment method was applied, a significant improvement in hygienic status was observed: in patients with liver cirrhosis, the Hygiene Index decreased to 1.9±0.15 points, while in Group II receiving conventional treatment, this indicator remained high at 2.8±0.21 points. The differences between the groups were statistically significant in all cases, ranging from $p<0.05$ to $p<0.01$, confirming the superiority of the comprehensive approach in restoring oral hygiene.

The most pronounced positive dynamics in Group I were also recorded for the PMA index, which reflects the inflammatory process in periodontal tissues. In patients with chronic hepatitis, after comprehensive treatment the PMA index decreased from 44.2% to 18.2%, whereas with the conventional method this indicator decreased only to 34.6% ($p<0.001$). In the liver cirrhosis group, the results in Group I, 24.6%, were twice as effective as those in Group II, 48.2% ($p<0.001$).

As the severity of chronic diffuse liver diseases increased, tooth enamel resistance decreased significantly compared with the control group, where it was 2.1±0.14 points. In particular, before treatment, the enamel resistance test indicator was 3.8±0.18 points in liver fibrosis, 5.4±0.22 points in chronic hepatitis, and 7.2±0.25 points in liver cirrhosis, where the lowest level of resistance was recorded. This finding scientifically substantiates the disruption of the mineralizing function of oral fluid and increased enamel demineralization under the influence of systemic pathology.

According to the comparative analysis, restoration of enamel resistance in Group I receiving comprehensive treatment was statistically more significant than in Group II receiving conventional treatment, with significance levels of $p<0.05$ and $p<0.01$. For example, in patients with liver cirrhosis, the enamel resistance test indicator improved to 4.3±0.21 points in Group I, while in Group II it remained at 6.1±0.24 points. In the chronic hepatitis group, the results in Group I, 3.1±0.18, were also considerably more effective than those of the conventional approach, 4.5±0.20. This confirms the high pathogenetic effectiveness of the developed comprehensive therapeutic and preventive algorithm in increasing the resistance of dental hard tissues.

Caries intensity in patients was significantly higher than in the control group, where the indicator was 3.2±0.24, and increased as the pathology became more severe. Before treatment, the caries intensity index was 5.8±0.31 in liver fibrosis, increased to 8.4±0.42 in chronic hepatitis, and reached 12.6±0.55 in liver cirrhosis, reflecting a decompensated condition.

During treatment dynamics, Group I, in which the developed comprehensive treatment method was applied, showed statistically more reliable results compared with Group II receiving conventional treatment in terms of halting the progression of caries intensity and stabilizing dental status ($p<0.05$ and $p<0.01$). In particular, in the chronic hepatitis group, the result in Group I, 5.2±0.33, was considerably more favorable than in Group II, 7.1±0.38, indicating a slowdown in the pathological process. In patients with liver cirrhosis, the comprehensive approach also resulted in stabilization of the caries intensity index at 7.8±0.46. The obtained data confirm the high effectiveness of the proposed multidisciplinary preventive and therapeutic algorithm in reducing carious destruction of hard dental tissues in patients with CDLD.

Conclusions. The study showed that as the severity of chronic diffuse liver diseases increased, from fibrosis to cirrhosis, a significant deterioration in dental status was observed. The Hygiene Index increased from 2.2 to 3.6 points, tooth enamel resistance decreased, and caries intensity increased from 5.8 to 12.6 in cirrhosis.

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The comprehensive approach used in the study, which included Rotokan and physiotherapy consisting of vitamin C electrophoresis and UHF therapy, demonstrated higher effectiveness compared with the conventional method. In particular, in patients with liver cirrhosis, the PMA index decreased to 24.6% after comprehensive treatment, which was twice as effective as after conventional treatment, where it remained at 48.2%. Statistically significant positive results were also achieved in restoring tooth enamel resistance.

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