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Comparative characteristics of the amount of cytokines in patients with hepatitis B and C

Viral hepatitis occupies one of the leading positions in the structure of diseases affecting the health care system of all countries of the world, and remains one of the complex and unsolved problems of medicine as the main cause of liver failure [1, 2, 3].

The problem of viral hepatitis is also important for the Armed Forces, which are the guarantor of the independence of each state. Timely diagnosis of viral hepatitis among new recruits, as well as among military personnel already in service, is distinguished by its importance. Undiagnosed viral hepatitis can later lead to the spread of viral infection among other military personnel. The diagnosis of the virus has a significant strategic importance among those in the service for the prevention of liver failure and cirrhosis due to the damaging effect of that virus on the liver in the future [4, 5, 6, 7].

One of the problems faced by the army is the identification of patients with latent viral hepatitis and their involvement in the treatment process. In most cases, physically strong military personnel associate mild symptoms of viral infection with the general condition, do not allow the presence of the disease at all, and consider themselves to be practically healthy [8, 9, 10].

Numerous clinical studies have been conducted in the direction of diagnosis, clinic and treatment of viral hepatitis so far and valuable practical recommendations have been given. However, the determination of cytokines in the blood in the direction of complex diagnosis of viral hepatitis in military personnel, those undergoing medical services, as well as in conscripts and attendees of military schools, has remained an unstudied field.

The purpose of the study: Study of the amount of cytokines and TNF-alpha in the blood of military personnel with latent hepatitis infection, comparing the results with patients with steatosis and practically healthy individuals.

Material and methods: The material of the study was composed of 89 military personnel examined at the Central Military Polyclinic and Military Hospital of

the Ministry of Defense of the Republic of Azerbaijan. Patients were divided into 3 main groups: hepatitis B group consisted of 45 people (50.6%), hepatitis C group 21 people (23.6%), steatohepatosis group consisted of 23 people (25.8%).

General and biochemical analysis of blood was performed on all patients. At the same time, USM, FEQDS and X-ray examinations from clinical-instrumental examinations were carried out in full order. In addition to the mentioned examinations, the amount of IL-1 β , IL-6 and TNF alpha in the blood of this group of patients was determined in order to check the activity of inflammatory responses during hepatitis infections, and the changes in the secretion of these cytokines in patients with hepatosis were compared. A control group consisting of 20 practically healthy military personnel was created to verify the parameters in the main groups. The indicators obtained in the groups were compared among themselves.

Blood tests were performed on a Sysmex XS 500i automatic analyzer. During the investigation of the immune status, determination of IL-1 β , IL-6, TNF-alpha was determined using the reagents of the BIOSOURCE (INVITROGEN) company by the immune enzyme analysis method on the "Medispec-6000" (RT-6000, Microplate Reader) device. During our research, the "sandwich" type of solid-phase enzyme immunoassay was used in the analysis. At this time, the amount of specific antibodies was determined through the antigen-antibody reaction, as well as with the help of the enzymatic process. The intensity of the staining recorded during the course of the reaction is directly proportional to the amount of immunoglobulins and cytokines in the serum.

All numerical indicators obtained during the study were subjected to statistical processing taking into account modern recommendations. The comparison of indicators was carried out based on the non-parametric Mann-Whitney U-criterion (U-test). Pearson and Spearman methods were applied for the purpose of correlative relationship integrity.

Statistical processing of numerical and percentage results was performed on a personal computer using the IBM SPSS 22 application program package.

Conclusions and discussion: During viral hepatitis, the amount of IL-1 β , IL-6 and TNF alpha was determined among many types of tissue cytokines, and the changes in the secretion of these cytokines in patients with hepatosis were compared.

The average amount of IL-1 β in the blood of patients with hepatitis B was 27.85 $\pm$ 1.58 pg/ml, 16.71 $\pm$ 1.38 pg/ml in the hepatitis C group, and 13.32 $\pm$ 1.04 pg/ml in patients with hepatosis. Statistically higher results were confirmed in hepatitis B group than hepatitis C patients ($p < 0.001$). In the control group, the average amount of IL-1 β in the blood was 2.95 $\pm$ 0.13 pg/ml. was found to be statistically significantly ($p < 0.001$) smaller than the indicators in the other 3 groups. The analysis of the obtained results proved that IL-1 β has an important diagnostic value in liver viral diseases.

The concentration of IL-6 was characterized by a general increase in patients infected with hepatitis B and C virus. When practical healthy military servicemen were compared, the results were found to be statistically significant ($p < 0.001$). In patients with hepatosis, the amount of IL-6 was 2.72 $\pm$ 0.13 pg/ml. was not statistically significantly different when compared with both Hepatitis B and Hepatitis C groups ($p > 0.05$).

TNF alpha (or tumor necrosis factor) TNF acts as a mediator of specific and non-specific reactions of the body. In addition to forming an important link between immune responses, it also plays an important role in inflammatory processes. Determination of this mediator is significantly important in assessing the immune status of the body and in predicting the course of diseases of viral etiology.

During our research, TNF alpha in hepatitis B group was 12.46 $\pm$ 0.67 pg/ml. which is 1.5–2 times more than normal indicators. In the hepatitis C group, the mean amount of TNF alpha was 9.12 $\pm$ 0.84 pg/ml. was equal to, was significantly ($p < 0.001$) higher than the control group. However, compared to hepatitis B virus, the mean amount of TNF alpha was statistically significantly lower in patients infected with hepatitis C virus ($p < 0.001$).

In the group of patients with hepatosis, the amount of TNF-alpha was 9.2 $\pm$ 0.71 pg/ml. was. If, when comparing hepatitis B, the amount of TNF alpha determined in patients with hepatosis was statistically significantly lower, while patients with hepatitis C showed almost the same indicators and no difference between the results. In practically healthy individuals, a change in the amount of TNF-alpha was observed in the normal range.

Conclusion: Determination of immune response parameters and cytokines in the blood during hepatitis B and C virus infections among military personnel has important perspectives as a new direction in the diagnosis of viral hepatitis. Thus, the results of general and biochemical analysis of blood may not show specific changes during examination of military personnel infected with hepatitis B and hepatitis C viruses. However, during detailed physical and clinical-instrumental examinations, the changes caused by the organs of the digestive tract, especially the morpho-functional state of the liver, should also be taken into account. In some cases, direct application of the mentioned changes to specific viral lesions of the liver causes difficulties from the point of view of differential diagnosis.

The diagnostic effectiveness of our proposed laboratory indicators to distinguish the changes in patients with steatosis of the liver caused by metabolic disorders from liver pathology caused by hepatitis viruses has been proven. The amount of IL-1 β and TNF alpha in the blood of patients infected with hepatitis B and C virus increases significantly. Compared to patients with hepatitis, the difference between the results was statistically significant ($p < 0.05$), it was confirmed that cytokines were more specific for patients with Hepatitis B.

Thus, IL-1 β and TNF alpha are highly effective markers for determining the severity of the inflammatory process in the early diagnosis of hepatitis B and hepatitis C. Measurement of these cytokines ambulatory and clinical diagnostic its inclusion in the list of tests can be beneficial in the direction of early diagnosis and prevention of complications.

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Порівняльна характеристика кількості цитокінів у хворих на гепатит В і С

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Проблема вірусних гепатитів актуальна і для Збройних Сил, які є гарантом незалежності кожної держави. Важливою є своєчасна діагностика вірусних гепатитів у новобранців, а також у військовослужбовців, які вже пройшли службу. Недіагностований вірусний гепатит згодом може призвести до поширення вірусної інфекції серед інших військовослужбовців. Діагностика вірусу має важливе стратегічне значення серед військовослужбовців для профілактики печінкової недостатності та цирозу печінки через ушкоджувальну дію цього вірусу на печінку в майбутньому.

Мета дослідження: вивчення кількості цитокінів і TNF-альфа в крові військовослужбовців з латентною гепатитною інфекцією, порівняння результатів з хворими на стеатоз і практично здоровими особами.

Матеріал і методи. Матеріал дослідження склали 89 військовослужбовців, обстежених у Центральній військовій поліклініці та військовому госпіталі Міністерства оборони Азербайджанської Республіки. Хворі були розподілені на 3 основні групи: група гепатиту В – 45 осіб (50,6%), група гепатиту С – 21 особа (23,6%), група стеатогепатозу склали 23 особи (25,8%).

Висновок: Визначення параметрів імунної відповіді та цитокінів крові при гепатиті В і С вірусних інфекцій серед військовослужбовців має важливі перспективи як новий напрям у діагностиці вірусних гепатитів. Таким чином, результати загального та біохімічного аналізу крові можуть не показати специфічних змін при обстеженні військовослужбовців, інфікованих вірусами гепатиту В і С.

Ключові слова: гепатит В, гепатит С, печінка, запалення, цитокін.

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Conclusion: Determination of immune response parameters and cytokines in the blood during hepatitis B and C virus infections among military personnel has important perspectives as a new direction in the diagnosis of viral hepatitis. Thus, the results of general and biochemical analysis of blood may not show specific changes during examination of military personnel infected with hepatitis B and hepatitis C viruses.

Key words: Hepatitis B, hepatitis C, liver, inflammation, cytokines.

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