Dynamics of Biochemical Changes in Viral B Virus Hepatitis

MALINA COMAN[1], IULIA CHISCOP[1]*, MADALINA NICOLETA MATEI[1], LAURA GHIBU[2], EGIDIA MIFTODE[2], CARMEN DOROBAT[2], AUREL NECHITA[1], KAMEL EARAR[1], MARIANA ILIE[1], MIHAELA MOISEI[1], DANIELA LECA[2]

[1] "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, 47 Domneasca Str., 800008, Galati, Romania

[2] "Gr.T.Popa" University of Medicine and Pharmacy Iasi, 16 Universitatii Str., 700115, Iasi, Romania

The aim of the study was the analysis of biochemical changes and correlation with the clinical course of hepatitis B virus. The study was retrospective and included 140 patients with hepatitis B virus (HBV), admitted to the Infectious Clinic Iasi from 2005 to 2013. The values of ALT, bilirubin, alkaline phosphatase and Quick index were analysed at admission (I), after 10 days (II) and discharge (III) values were correlated with clinical outcome. At admission ALT values over 2000UI/l were registered in 40% of cases, values between 1000 and 2000 UI/l in 25%, and under 1000 UI/l the rest. After 10 days the percents were 18%, 22% and 37%. At discharge the majority of the patients had lower values of ALT (45%), high values were present at the patients with bad evolution. Bilirubin had low values in 47.5% of patients, medium values in 31% and raised in 21.5%, correlated with mild, moderate and severe form of the disease. Quick index was between 60-79%, 40-59% and below 40% in 32%, 18% and 12% of the cases, low values were registered in severe form of the disease. The dynamics of biochemical changes may be predictive for the clinical evolution and prognosis of the patients with acute B virus hepatitis.

Keywords: biochemical changes, hepatitis B virus, bilirubin, alkaline phosphatase

B Hepatitis is a serious disease of the liver, caused by B hepatic virus (VHB). It can cause long term complications, which can generate hepatic impairment, cirrhosis or hepatic cancer, being the tenth cause in mortality in the world. On the globe, over 2 billion people are infected with B hepatic virus and around 300-400 million suffer of a chronic infection with this virus.

Experimental part

Materials and method

We performed a retrospective study that included 140 patients with acute B virus hepatitis (VHB), admitted to "Sf. Parascheva" Infectious Clinic of Iasi between 2005-2013.

The values of ALT, bilirubin, alkaline phosphatase and Quick index were analysed at admission (I), after 10 days (II) and discharge (III), the values being correlated with clinical outcome.

Results and disscutions

Upon hospital admission, 40% of patients (56 cases) presented raised values of transaminases, over 2000 UI/l, values between 1000 and 2000 UI/l in 25% of the cases, and the values between 401 and 1000UI/l and, respectively, less than 400 UI/l, were comparable (17%, respectively 18%).

After 10 days of evolution, the percentage of patients with ALT values higher than 2000 UI/l decreased at half, (25 cases – 18.86%), of the patients with values of 1001-2000 UI/l and respectively 400-1000 UI/l remained relatively constant (22.14%, respectively 20.72%), while the percentage of the cases with low values increased significantly (from 10% to 26.6%).

At dismissal, most of patients (65 cases – 46%) had low values of transaminases, 5 patients (3.5%) had raised values of ALT, with severe course (table.1).

Note that in 5 cases, a sudden drop of transaminases was recorded, from over 2000 UI/l to smaller values of 200 UI/l in the first 14 days from admission. This aspect coincided with the occurrence of a symptomatology suggesting a serious course, outlining a fulminatory form of disease, with death occurring in 2-8 days.

Analyzing the ALT values at admission and dismissal, a direct correlation between the number of patients and ALT values at admission (low ALT values – small number of patients, raised ALT values – big number of patients) is noticed, and, respectively, indirect at dismissal (low ALT values – high number of patients, raised ALT values – small number of patients).

Regarding bilirubinemia in patients under study, a predominance of the cases with low values of bilirubinemia at admission (66 cases – 47.5%) is noticed, with percent decrease of cases in values of bilirubinemia between 5 and 15 mg/dL (43 cases – 31%) and over 15 mg/dL (30 cases – 21.5%).

No. of cases (%) TGP (UI/l)	(I) Admission	(II) 10 days	(III) Dismissal
<100	14 (10%)	37 (26.5%)	65 (46%)
101-400	11 (8%)	18 (12.85%)	25 (18%)
401-1000	24 (17%)	29 (20.72%)	32 (23%)
1001-2000	35 (25%)	31 (22.14%)	13 (9.5%)
>2000	56 (40%)	25 (18.86%)	5 (3.5%)
Total	140 (100%)	140 (100%)	140 (100%)

Table 1
DYNAMICS OF TRANSAMINASES IN ACUTE B VIRAL HEPATITIS

* *email: iulia.chiscop@yahoo.com*

No. of cases (%) Bilirubinemia (mg/dl)	(I)	(II)	(III)
<5	67 (47.5%)	95 (67.85%)	132 (94.3%)
5.1-15	43 (31%)	25 (17.85%)	5(3.57%)
>15	30 (21.5%)	20 (14.3%)	3 (2.13%)
Total	140 (100%)	140 (100%)	140 (100%)

Table 2
DYNAMICS OF BILIRUBINEMIA IN ACUTE B VIRAL HEPATITIS

Quick index	No. of cases	%
80-100%	53	38
60-79%	45	32
40-59%	25	18
<40%	17	12
Total	140	100%

Table 3
VALUES OF QUICK INDEX IN ACUTE B VIRAL HEPATITIS

FA (UI/l)	No. of cases	%
>400	24	32.4
301-400	8	10.8
201-300	18	24.3
136-200	14	18.9
<135	10	13.5
Total	74	100

Table 4
VALUES OF ALKALINE PHOSPHATASE IN ACUTE B VIRAL HEPATITIS B

In other two assessment moments, a percent increase of cases with values under 5 mg/dl, (67.85%, respectively 94.3%) and a decrease of the ones with values of bilirubinemia of 5-15 mg/dL (17.85%, respectively 3.57%) and over 15 mg/dl (14.3%, respectively 2.13%), (table 2).

Quick index recorded values of 80-100% in 38% of cases, values of 60-79 % in 32% of cases and values of 40-59% , respectively <40% in 18% and respectively 12% of cases, (table 3).

Alkaline phosphatase (FA) was analyzed in 74 cases only, values over 300 UI in 32 cases, values of 201-300 UI in 18 cases and under 200 UI in rest, being recorded (table 4).

Note that raised values of FA were noticed in patients with cholestatic forms of the disease, predominantly with values of bilirubinemia over 15 mg/dL.

As terminology, "cytolysis syndrome" focuses on the cellular lesion as determinant factor, especially metabolic and non-specific disorder (similar according to different types of aggression – viral, inflammatory, autoimmune, toxic) and which affects the energetic cellular system. The cytolysis syndrome expresses biochemically by the appearance of cellular constituents in circulation, triggering enzymatic, vitamin and mineral serum changes.

The enzymatic changes are researched in practice by establishing two kinds of transaminase: glutampiruvic transaminase (GPT) also called alaninaminotransferase (ALAT) and glutamooxalacetate transaminase (GOT), also called aspartataaminotransferase (ASAT). The titre of transaminases in blood is not given by the severity of the cellular lesion, but by the number the cells concomitantly suffering. Thus, this titre gets a diagnosis value due to very raised values in acute hepatitis, the serum titre of GPT increasing 20-50 times over the normal values when over 50% of hepatic cellular mass is affected. The values of transaminases are important in some key moments of the patient's balance: when establishing the positive diagnosis, when appreciating the stage of the course, when appreciating the efficient therapy or failure, relapse, as markers for new aggression factors, but without prognosis value.

In our study, the raised values of GPT at admission were recorded in most patients, no matter of the disease clinic form.

The persistence of the raised values was noticed in severe forms only. The predictive value for a fulminatory course had a sudden decrease of the cytolysis tests, aspect met in all the cases of death.

The function of protein synthesis is the most resistant, is the last to decompensate, giving the measure – limit of the functional deficit. From hundreds of synthesised proteins, most of the majority - intracellular, the protrombina has the major diagnosis role and prognosis, because it has the fastest turn-over and it can be measured by a technique accessible to any laboratory. Quick time changes significantly and early, 48-96 hours before the de-compensation clinical signs, having a significant warning value in a period of high therapeutic efficiency. In this study, the decrease of Quick index under 40% was in concordance with the severe course of acute B viral hepatitis, with death in 5 cases.

In acute viral hepatitis, the hepatocyte, by metabolic-energetic deficit, is incapable of conjugation, but (by losing the selectivity of membrane permeability) will become permeable for conjugated bilirubine (from other cells), which are fully crossing it with discharge in sinusoid capillary alike an open "window". The process will have two major consequences: the apparition and increase of conjugated bilirubine in blood, with hyperbilirubinemia and annulment of bile's flow intrinsic pressure towards the intestine, decolouring the faeces. Re-colouring of faeces, almost at the same time with urine decolouring, will be the first signs of recovery of the biligenetic function, and implicitly, of the cellular repairs, as well as of the recovery of membrane selective permeability. In icteric forms of hepatitis, icter intensity is indirectly proportional with the severity of cellular lesions (a paradox at first sight), because extended and severe cellular lesions lower very much the conjugation capacity, and the titre of firect bilirubine will be moderated. The other way round, an intense expresses a good conjugation capacity, a higher number of normal cells, thus. It also increases the titre of indirect bilirubine, because the number of functional cells that are capable of conjugations is exceeded by the charge of indirect bilirubine, which accumulates proportionally with the existent deficit.

Bilirubinemia (conjugated and free), having normal values of 0.8-1.2 mg/dL, raised in adult up to 5 mg/ dL in mild forms, up to 15 mg/dl in average forms and over these values in severe forms. If at admission half of patients of the studied group had values of bilirubinemia of over 5 mg/ dL, at dismissal only 5% were still within this category.

Alkaline phosphatase (FAL) was initially considered an excretion enzyme, but it was proved it was also of hepatic synthesis. So, its increase may be explained by obstruction, and also by raised synthesis of canalicular proliferation. It increases in viral hepatitis up to double of normal. It is the most sensitive test of cholestasis, although it increases only a part of the patients with cholestasis. In our study, FAL was raised only in patients with bilirubinemia higher than 5 mg/dl, raised values (over 300 ui/L) being recorded in those with cholestatic forms of the disease.

Conclusions

The analysis of the biochemical changes in acute B viral hepatitis represents an element of high utility that, together with the clinical exam, allows establishing the correct diagnosis of the disease, appreciating the course status, the differentiation from other hepatic pathologies, having, at the same time, predictive value for the clinical evolution and the patient's prognosis.

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