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Research Article

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STUDY ON SERUM LEVELS OF HBV DNA, HBsAg, AND HBeAg IN PATIENTS WITH CHRONIC HEPATITIS B AND CIRRHOSIS IN CAN THO CENTRAL GENERAL HOSPITAL IN 2024–2025

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ABSTRACT

Background: Chronic hepatitis B with cirrhosis is a severe condition that has a high risk of complications such as liver failure, hepatocellular carcinoma and death. Monitoring biomarkers such as HBV-DNA, HBsAg, and HBeAg plays a crucial role in assessing viral activity, predicting disease progression, and guiding effective treatments. **Objectives:** To determine HBV-DNA, HBsAg, and HBeAg levels and learn about some factors associated with these markers in patients with chronic hepatitis B with cirrhosis at Can Tho Central General Hospital during 2024–2025. **Materials and methods:** A cross-sectional analytical study was conducted on 120 patients who were diagnosed with chronic hepatitis B and cirrhosis andwere examined and treated in Can Tho Central General from June 2024 to February 2025. Patients underwent testing for AST, ALT, bilirubin, albumin, HBV-DNA viral load, HBsAg, and HBeAg. Data were collected and analyzed using SPSS 26.0. **Results:** The average concentration of the tests with AST is 161.42 ± 236.46 U/L, ALT: 162.05 ± 318.43 U/L, bilirubin: 59.79 ± 109.18 µmol/L, albumin: 29.15 ± 6.43 g/L, HBV-DNA viral load: 5.88 ± 2.37 log10 copies/mL, HBsAg: 3.30 ± 0.46 log10 IU/mL, and the HBeAg (+) rate is 17.5%. **Conclusion:** The study shows an association between elevated AST, ALT, and bilirubin levels and decreased albumin levels with HBV-DNA concentration ($p<0.05$), but no relation with HBeAg ($p>0.05$). Additionally, a relationship is found between AST and albumin with HBsAg levels ($p<0.05$). Notably, HBV-DNA and HBsAg are closely related ($p = 0.001$), and the proportion of HBeAg-positive cases is also associated with HBV-DNA levels ($p = 0.007$). However, there is no statistically significant difference in HBsAg levels between the HBeAg-positive and HBeAg-negative groups ($p = 0.974$).

Keywords: Chronic Hepatitis B, Cirrhosis, HBV DNA, HBsAg, HBeAg.

INTRODUCTION

Chronic hepatitis B virus (HBV) infection is a serious global health problem. According to the World Health Organization (WHO), it is estimated that in 2022, approximately 254 million people were living with chronic hepatitis B and there are approximately 1.2 million new infections each year. The disease has also caused approximately 1.1 million deaths, mainly due to cirrhosis and hepatocellular carcinoma [14]. Vietnam is one of the countries with a high prevalence of chronic hepatitis B virus in the world, with an estimated 6.6% of the population infected with the disease [13]. In particular, the rate of cirrhosis patients due to chronic hepatitis B virus infection in Vietnam is 35%, while this figure is estimated at approximately 42% in the world [12]. The management of patients with chronic hepatitis B, especially when they are accompanied by cirrhosis, remains challenging due to the high risk of complications from liver failure to cancer and death. Monitoring of biomarkers such as HBV-DNA, HBsAg, HBeAg plays a key role in assessing the level of viral activity, predicting progression and guiding effective treatments. However, data on the fluctuations of these biomarkers and factors related to the above indicators in patients with chronic hepatitis B with cirrhosis in the Mekong Delta region are limited. This study was conducted at Can Tho Central General Hospital with the following objectives:

+ Determine the concentrations of HBV-DNA, HBsAg, HBeAg in patients with chronic hepatitis B with cirrhosis.

+ Study some factors related to the concentrations of HBV-DNA, HBsAg, HBeAg in patients with chronic hepatitis B with cirrhosis.

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SUBJECTS AND METHODS OF RESEARCH

Research subjects

Patients who came to Can Tho Central General Hospital for examination and treatment and were diagnosed with chronic hepatitis B and cirrhosis.

- **Sample selection criteria**: Patients who agreed to participate in the study and met the criteria for diagnosing chronic HBV infection: HBsAg (+) > 6 months, HBV-DNA in serum changed from undetectable to several million IU/mL, HBeAg (+) or (-), normal or increased ALT/AST and met the criteria for diagnosing cirrhosis with a history of chronic liver disease; clinically with hepatocellular failure syndrome (limb edema, hemorrhage, jaundice, spider angiomas, palmar erythema) and portal hypertension syndrome (ascites, splenomegaly, esophageal varices, collateral circulation); paraclinical (cytopenia, increased bilirubin, decreased albumin, liver ultrasound, Fibroscan, endoscopy, liver biopsy).
- Exclusion criteria: Patients under 18 years old, patients who do not cooperate after sampling or do not comply with the requirements of the study.

Research methods

- **Research design**: Cross-sectional descriptive study.
- **Sample size and method for sample selection**:

Number of samples:

$$\mathbf{n} = Z^2_{(1-\frac{\alpha}{2})}\frac{p(1-p)}{d^2}(1)$$

In which

Z=1.96 with 95% confidence, d=0.09: the allowable error.

p: the proportion of patients with cirrhosis due to chronic hepatitis B virus infection. According to author Catharina Johanna Alberts *et al.,*(2022), the proportion of patients with cirrhosis due to chronic hepatitis B virus infection in Vietnam is 35.0% [12], so we choose p = 0.35.

Substituting the values into formula (1), we have n = 108. The estimated number of poor quality or missing samples is 10%, so the total sample size is: n = 108+(108 x 10%)=119 samples. The minimum sample size of the study is 119. However, in fact, we collected 120 samples during the study.

Sampling method: Convenient sampling.

- **Research content:**

+ Determination of concentrations and ratios of tests
The ALT and AST tests in the patient's serum were determined by the enzyme kinetic method at a wavelength of 340nm, conducted on the Cobas 8000 automatic biochemical system, at the Biochemical Laboratory, Can Tho Central General Hospital. Normal values: ALT < 40 U/L, AST: < 40 U/L.

The bilirubin test in the patient's serum was determined by the colorimetric method at a wavelength of 546nm, conducted on the Cobas 8000 automatic biochemical system, at the Biochemical Laboratory, Can Tho Central General Hospital. Normal values: < 17 µmol/L.Serum albumin testing of patients by colorimetric method at 570 nm wavelength, conducted on Cobas 8000 automatic biochemical system, at Biochemical Laboratory, Can Tho Central General Hospital. Normal value: 35-50 g/L.

HBV-DNA testing was determined by Real-time PCR technique on Abbott's Alinity M real-time PCR system on Alinity m AMP kit with a detection threshold of 7.0 IU/mL, conducted at the molecular biology laboratory, Can Tho Central General Hospital. Divided into 2 groups: HBV-DNA < 5 log10 copies/mL, HBV-DNA ≥ 5 log10 copies/mL.

HBsAg testing was determined by a dual-step chemiluminescent immunoassay technique with CDP-StarTM chemiluminescent substrate using the HISCLTM HBsAg test kit, conducted on the Lumipulse G1200 system of Fujirebio at the Immunology Laboratory, Can Tho Central General Hospital. The results were determined using a previously established standard curve. Reference value: <0.05IU/mL. Divided into 2 groups: HBV-DNA < 3 log10 IU/mL, ≥ 3 log10 IU/mL.

HBeAg testing was determined by the 2-step dual chemiluminescent enzyme immunoassay technique with CDP-StarTM chemiluminescent substrate using the HISCLTM HBeAg test kit, conducted on the Lumipulse G1200 system of Fujirebio at the Immunology Laboratory, Can Tho Central General Hospital. The result obtained is an index calculated by the ratio between the two optically measured values of the sample (Sample Relative light units- RLU) and the cut-off value (cut-off RLU). Divided into 2 groups HBeAg(-): <1 S/Co and HBeAg(+): ≥1 S/Co.

+ Analysis of some factors related to the concentration of HBV DNA, HBsAg, HBeAg

Data analysis: Using SPSS 26.0 and Excel 2016 software. Describe the general characteristics of the study sample using descriptive statistics. For qualitative variables, we use frequencies and proportions, proportion test with Chi-Square test, T-Test or ANOVA. For quantitative variables, we describe them with average, standard deviation, minimum value, maximum value. With statistical significance level p<0.05, confidence interval 95%.

RESEARCH RESULTS

General characteristics of the research subjects

Table 1. Age groups and genders of the research subjects

Age groups and genders		Number of participants	Rate (%)
Age groups	< 40-year-old	1	0,8
	40 – 60-year-old	65	54,2
	> 60-year-old	54	45,0
Average age (The youngest- the oldest)	61,68 ± 11,44 (39-93)		
Genders	Male	72	60
	Female	48	40
Total		120	100

Remarks: The average age is 61.68 ± 11.44, the age ranges from 39 to 93, the 41-46 year-old-group accounts for (54.2%), the > 60-year-old group accounts for (45.0%) and the < 40-year-old group accounts for (0.8%). Regarding genders, men are more dominant (60%) than women (40%)

Table 2. Average concentrations and ratios of biochemical tests

Test	Average concentration ($\bar{x}$ ± SD)	Rate of increase and decrease of tests	Frequency (n=120)	Rate (%)
AST (U/L)	161,42 ± 236,46	Normal	23	19,2
		Increase less than 2 times of ULN	35	29,2
		Increase 2 times of ULN or more	62	51,7
ALT (U/L)	162,05 ± 318,43	Normal	38	31,7
		Increase less than 2 times of ULN	35	29,2
		Increase 2 times of ULN or more	47	39,2
Bilirubin (µmol/L)	59,79 ± 109,18	< 17 µmol/L	58	43,8
		17-30 µmol/L	25	20,8
		> 30 µmol/L	37	30,8
Albumin (g/L)	29,15 ± 6,43	35-50 g/L	20	16,7
		30-34 g/L	33	27,5
		< 30 g/L	67	55,8

Remarks: The average concentrations of AST and ALT are 161.42 ± 236.46 U/L and 162.05 ± 318.43 U/L, respectively, bilirubin is 59.79 ±109.18 µmol/L, and albumin is 29.15 ± 6.43 g/L. The rates of increased AST and ALT are 80.9% and 68.4%, respectively. In

addition, the rate of bilirubin >17 µmol/L is 51.6%, of which 30.8% exceeds 30 µmol/L and 55.8% of patients has albumin < 30 g/L.

HBV-DNA, HBsAg, HBeAg concentrations of research subjects

Table 3. Average concentrations of HBV-DNA, HBsAg of research subjects.

Test	Average concentration ($\bar{x} \pm$ SD)	The lowest	The highest
HBV-DNA (log_{10} copies/mL)	5,88 ± 2,37	1,74	9,74
HBsAg (log_{10}IU/mL)	3,30 ± 0,46	1,58	3,77

Remarks: The average concentration of HBV-DNA is 5.88 ± 2.37 log_{10} copies/mL, HBsAg is 3.30 ± 0.46 log10 IU/mL.

Table 4. Rates of HBV-DNA, HBsAg, HBeAg of the research subjects.

Characteristics		Frequency (n=120)	Rate (%)
HBV-DNA	< 5 log_{10} copies/mL	45	37,5
	≥ 5 log_{10} copies/mL	75	62,5
HBsAg	< 3 log_{10} IU/mL	15	12,5
	≥ 3 log_{10} IU/mL	105	87,5
HBeAg	< 1 S/CO	99	82,5
	≥ 1 S/CO	21	17,5

Remarks: The rate of HBV-DNA patients with concentrations ≥ 5 log10 copies/mL is 62.5%. HBsAg ≥ 3 log10 IU/mL is **87.5% and 17.5%** of patients has HBeAg (+) (≥ 1 S/CO).

Some factors related to HBV-DNA, HBsAg, HBeAg concentrations of the research subjects

Table 5. Correlation between age, gender, AST, ALT, bilirubin, albumin, HBsAg, HBeAg with HBV-DNA concentrations of the research subjects.

Characteristics		Frequency (n=120)	Average concentration HBV-DNA ($\bar{x} \pm$ SD) (log_{10} copies/mL)	p
Age groups	≤ 60-year-old	66	5,64 ± 2,47	0.226 *
	> 60-year-old	54	6,17 ± 2,26	
Genders	Male	72	6,10 ± 2,39	0.221 *
	Female	48	5,56 ± 2,35	
AST	Normal	23	4,07 ± 2,20	0,000 **
	Increase less than 2 times of ULN	35	5,84 ± 2,15	
	Increase 2 times of ULN or more	62	6,58 ± 2,23	
ALT	Normal	38	4,52 ± 2,13	0,000 **
	Increase less than 2 times of ULN	35	5,75 ± 2,21	
	Increase 2 times of ULN or more	47	7,08 ± 2,07	
Bilirubin	< 17 µmol/L	58	5,34 ± 2,49	0,037 **
	17-30 µmol/L	25	6,10 ± 2,20	
	> 30 µmol/L	37	6,59 ± 2,15	
Albumin	35-50 g/L	20	4,03 ± 2,10	0,000 **
	30-34 g/L	33	5,38 ± 2,33	
	< 30 g/L	67	6,69 ± 2,14	
HBsAg	< 3 log_{10} IU/mL	15	3,95 ± 1,97	0,001 **
	≥ 3 log_{10} IU/mL	105	6,16 ± 2,31	
HBeAg	< 1 S/CO	99	5,62 ± 2,37	0,007 **
	≥ 1 S/CO	21	7,14 ± 2,06	

*T-test **ANOVA test

Remarks: In 120 patients with chronic hepatitis B with cirrhosis, AST, ALT, bilirubin and albumin are significantly related to HBV-DNA (p<0.05), HBV-DNA is higher when AST, ALT, bilirubin increase or albumin decreases. In addition, HBV-DNA is also higher in the HBsAg ≥ 3 log10 IU/mL group and the HBeAg-positive group (p<0.05). In contrast, there is no relationship between HBV-DNA and age and gender (p>0.05).

Table 6. Relationship between age, gender, AST, ALT, bilirubin, albumin, HBV-DNA, HBeAg and HBsAg concentration of the study subjects.

Characteristics		Frequency (n=120)	Average concentration HBsAg ($\bar{x} \pm$ SD) (log_{10} IU/mL)	p
Age groups	≤ 60-year-old	66	3,29 ± 0,51	0,807 *
	> 60-year-old	54	3,31 ± 0,40	
Genders	Male	72	3,30 ± 0,49	0,781 *
	Female	66	3,29 ± 0,42	
AST	Normal	23	3,09 ± 0,57	0,033 **
	Increase less than 2 times of ULN	35	3,28 ± 0,55	
	Increase 2 times of ULN or more	62	3,39 ± 0,32	
ALT	Normal	38	3,18 ± 0,58	0,071 **
	Increase less than 2 times of ULN	35	3,28 ± 0,53	
	Increase 2 times of ULN or more	47	3,41 ± 0,24	
Bilirubin	< 17 µmol/L	58	3,26 ± 0,53	0,585 **
	17-30 µmol/L	25	3,38 ± 0,44	
	> 30 µmol/L	37	3,30 ± 0,34	
Albumin	35-50 g/L	20	3,12 ± 0,60	0,032 **
	30-34 g/L	33	3,21 ± 0,56	
	< 30 g/L	67	3,39 ± 0,32	
HBV-DNA	< 5 log_{10} copies/mL	45	3,06 ± 0,60	0,000 **
	≥ 5 log_{10} copies/mL	75	3,43 ± 0,26	
HBeAg	< 1 S/CO	99	3,29 ± 0,48	0,974 **
	≥ 1 S/CO	21	3,30 ± 0,35	

*T-test **ANOVA test

Remarks: In 120 patients with chronic hepatitis B with cirrhosis, AST and albumin are significantly correlated with HBsAg levels (p<0.05), in which HBsAg is higher when AST increases or albumin decreases. On the contrary, no statistically significant differences arefound between age, gender, ALT, bilirubin and HBeAg with HBsAg (p>0.05).

Table 7. Correlation between age groups, genders and HBeAg rate of study subjects.

Characteristics		HBeAg rate		OR (KTC 95%)	p
		< 1 S/CO (n%)	≥ 1 S/CO (n%)		
Age groups	< 60-year-old	53 (44,2%)	13 (10,8%)	0,709 (0,270-1,861)	0,484 *
	> 60-year-old	46 (38,3%)	8 (6,7%)		
Genders	Male	59 (49,2%)	13 (10,8%)	0,908 (0,095-2,971)	0,844 *
	Female	40 (33,3%)	8 (6,7%)		

*Chi-Square test

Remarks: There is no statistically significant difference between age groups and genders with HBeAg rates in this study (p>0.05).

Table 8. Correlation of some biochemical test indicators with HBeAg rates of the research subjects.

Test	HBeAg rate		p
	< 1 S/CO (n=99)	≥ 1 S/CO (n=21)	
AST ($\bar{x}$± SD)	156,38 ± 240,52	185,14 ± 220,28	0,615 *
ALT ($\bar{x}$± SD)	150,42 ± 289,34	216,86 ± 435,07	0,387 *
Bilirubin ($\bar{x}$± SD)	57,40 ± 96,69	71,05 ± 157,98	0,605 *
Albumin ($\bar{x}$± SD)	29,35 ± 6,57	28,19 ± 5,81	0,454 *

*T-test

Remarks: There is no statistically significant difference between the concentrations of AST, ALT, bilirubin, albumin and HBeAg ratio (p>0.05).

DISCUSSION

General characteristics of the research subjects

The average age in our study is 61.68 ± 11.44, in which the 40–60-year-old group accounts for the highest proportion (54.2%), followed by the >60-year-old group (45.0%). This result is similar to the study of Pham Cam Phuong (2021) [7], La Van Ha (2022) [3] with the average age of (56.97 ± 11.59; 60.65 ± 11.14) and Tran Van Huy (2012) with the 40–60-year-old group accounting for 58.33% [5]. However, our average age is higher than that of Doan HieuTrung (2018) at 49.12 ± 11.41 [10]. This difference may be due to differences in sample selection criteria, sample size, and living conditions. In addition, our study results show that the proportion of men with chronic hepatitis B with cirrhosis is 60%. This trend is consistent with previous studies such as Doan HieuTrung (2018) recorded at 66.67% [10] and Nguyen Thi Mai (2021) at 66.61% [6]. The gender difference between men and women may be due to men having a weaker immune response, combined with behavioral factors such as drinking alcohol, smoking, and working in a toxic environment. Therefore, men are a high-risk group that needs to be screened and treated early.

The average AST concentration is 161.42 ± 236.46 U/L and ALT is 162.05 ± 318.43 U/L. Our research results are higher than the research results of Pham Cam Phuong (2021) with average AST, ALT of (140.8 ± 226 U/L; 90.7 ± 157.1 U/L) [7] and Nguyen Tien Thanh (2024) with average AST, ALT of (130.81 ± 205.17 U/L; 65.74 ± 85.55 U/L) [8], respectively. In addition, the rate of AST increased above normal level accounts for 80.9% and ALT is 68.4%, this result is higher than the study of Pham Quang Cu (2009) when the rate of increased AST and ALT are 54.0% and 60.2% [2]. The difference may be due to different research subjects, testing methods, treatment regimens and disease stages of the research subjects.

The average bilirubin concentration is 59.79 ± 109.18 µmol/L with 51.6% of patients having bilirubin >17 µmol/L, of which 30.8% >30 µmol/L. Our research results are similar to the results of Pham Quang Cu (2009), which showthe bilirubin >17 µmol/L is 56.0% [2], but higher than the study of Pham Cam Phuong (2021) with an average bilirubin concentration of 41.3 ± 120.9 µmol/L [7], while lower than the author Nguyen Tien Thanh (2024) with an average bilirubin concentration of 82.53 ± 108.36 µmol/L [8]. This difference may come from the different levels of liver damage and disease stages among patient groups in the studies.

The average albumin concentration is 29.15 ± 6.43 g/L with 55.8% of patients having albumin levels < 30 g/L. Our study results are similar to those of Nguyen Tien Thanh (2024) with an average albumin concentration of 29.7 ± 6.66 g/L [8] but lower than Pham Cam Phuong (2021) with an average albumin concentration of 36.4 ± 23.1 g/L [7]. The difference may be due to the more severe degree of cirrhosis in our study group as well as differences in research methods and treatment conditions.

HBV-DNA, HBsAg, HBeAg concentrations of the research subjects

The average HBV-DNA concentration in our researchis 5.88 ± 2.37 log10 copies/mL. This result is lower than the research's of Pham Cam Phuong (2021) [7] and Vito Di Marco (2005) [11] with average HBV-DNA concentrations of 7.72 ± 0.59 log10 copies/mL and 8.17 log10 copies/mL, respectively. In addition, the rate of HBV-DNA ≥ 5 log10 copies/mL is 62.5%, this result is also lower than the research of Nguyen Thi Cam Hong (2022) when the rate of HBV-DNA ≥ 5 log10 copies/mL is 45.3% [4]. In addition, our research also recordsthat the average HBsAg concentration of 3.30 ± 0.46 log10 IU/mL and the rate of patients with HBsAg ≥ 3 log10 IU/mL is 87.5%, which is consistent with chronic viral infection, but the results are slightly different from the study of Nguyen Thi Cam Hong (2022), in which the average HBsAg concentration is 4.06 ± 1.10 log10 IU/mL and the rate of HBsAg ≥ 3 log10 IU/mL is 80.0% [4]. The difference may be due to different study subjects, testing methods, or disease progression stages between research's.

Regarding the HBeAg rate, our study records a positive result of 17.5%. This result is similar to the studies of Doan HieuTrung (2018) [10] and Vito Di Marco (2005) [11] with the HBeAg (+) rate of 28.3% and 20.33%, respectively. This is consistent with the natural progression of chronic hepatitis B, when cirrhosis often appears at the stage when the virus is no longer replicating strongly, accompanied by HBeAg (-). However, our results are much lower than those of author Tran Van Huy (2012) with the HBeAg (+) rate of 58.33% [5]. The difference may be due to different disease stages, cirrhosis status, population characteristics, testing methods or treatment regimens.

Some factors related to HBV-DNA, HBsAg, HBeAg concentrations of the research subjects

Some factors related to HBV-DNA of the research subjects

The study results show no statistically significant differences between age, gender and HBV-DNA concentrations with p values of 0.226 and 0.221, respectively. This result is similar to the study of author Nguyen Van Ai *et al.,* (2014) with p>0.05 [1].

The analysis of the relationship between biochemical test indices and HBV-DNA shows a statistically significant difference (p<0.05). Specifically, patients with AST, ALT increasing ≥ 2 times ULN have the highest HBV-DNA (6.58 ± 2.21 and 6.99 ± 2.10 log10 copies/mL). Bilirubin > 30 µmol/L has HBV-DNA 6.59 ± 2.15 log10 copies/mL, albumin < 30 g/L has HBV-DNA 6.69 ± 2.14 log10 copies/mL. Our research results are similar to the research of author Nguyen Van Ai (2014) with p<0.05 [1]. The study results are also consistent with Tran Van Huy (2012) when it is noted that there is a correlation between HBV-DNA concentration and increased bilirubin and decreased albumin (p<0.05) [5]. This shows that HBV-DNA load is closely related to liver damage.

In addition, the research records a correlation between HBsAg, HBeAg and HBV-DNA. The HBsAg ≥ 3 log10 IU/mL group has higher HBV-DNA (6.16 ± 2.31 log10 copies/mL) than the < 3 log10 copies/mL group (3.95 ± 1.97 log10 copies/mL), with a statistically significant difference (p=0.001). HBeAg (+) patients have higher average HBV-DNA (7.14 ± 2.06 log10 copies/mL) than the HBeAg (-) group (5.62 ± 2.37 log10 copies/mL), with p=0.007. This result is consistent with the research of Nguyen Thi Cam Hong (2022) with p<0.05 [4], thus indicating that the relationship between HBsAg, HBeAg and HBV-DNA may exist throughout the chronic hepatitis B stage until the disease progresses to cirrhosis.

Some factors related to HBsAg of the research subjects

The study results do not show a statistically significant difference between age, genders and HBsAg concentration with p of 0.807 and 0.781, respectively. This result is somewhat similar to the research of Nguyen Thi Cam Hong (2022) when it finds no statistically significant difference between gender and HBsAg concentration (p=0.850). However, the author records a correlation between age and HBsAg (p=0.021) [4].

When analyzing the relationship between biochemical test indices and HBsAg concentration, the research shows that HBsAg has a statistically significant difference according to the increase in AST and decrease in albumin with p values of (0.028; 0.032), respectively. Only ALT and bilirubin do not show a statistically significant difference with p values of (0.071; 0.585), respectively. This result suggests that necrosis and impaired liver function may be related to HBsAg levels which are higher in patients with chronic hepatitis B with cirrhosis. However, our research is not consistent with Nguyen Thi Cam Hong (2022) when this author does not find a significant relationship between AST, ALT and HBsAg (p>0.05) [4].

In particular, the relationship between HBV-DNA and HBsAg load is very clear. The group of patients with HBV-DNA ≥ 5 log10 copies/mL has significantly higher HBsAg concentrations (3.43 ± 0.26 log10 IU/mL) than the group with HBV-DNA < 5 log10 copies/mL (3.06 ± 0.60 log10 IU/mL) with p=0.001 and is also similar to the study of Nguyen Thi Cam Hong (2022) with p<0.05 [4]. This result is consistent with the current understanding of the pathogenesis of HBV virus, in which HBsAg reflects the transcription level of cccDNA and the replication level of the virus, especially in the progressive stages of the disease. Notably, the study finds no difference in HBsAg between the HBeAg (+) and HBeAg (-) groups (3.30 ± 0.35 vs. 3.29 ± 0.48 log10 IU/mL, p=0.974). The reason can be that the study subjects are patients in the chronic hepatitis B stage with cirrhosis, where the expression of HBeAg is no longer the main factor determining the presence of the virus. However, the study by author Nguyen Thi Cam Hong (2022) in subjects with chronic hepatitis B records this relationship with p<0.05 [4].

Some factors related to HBeAg of the research subjects

The analysis of the relationship between HBeAg and age group shows that the rate of HBeAg (+) in the <60 year-oldgroup is 10.8% higher than that in the ≥ 60-year-old group (6.7%), however, the difference is not statistically significant (p=0.484, OR=0.709; 95% CI: 0.270-1.861). Similarly, the rate of HBeAg (+) in men is 10.8%, and it is 6.7% in women, but there is no significant difference (p=0.844, OR = 0.908; 95% CI: 0.095-2.971). This result is consistent with the study of author Nguyen Van Ai (2014) with p>0.05 [1], showing that HBeAg does not depend on age and genders but it can be affected by other factors such as immune response and HBV-DNA load.

Considering the relationship between biochemical indices and HBeAg, the results show that the average values of AST and ALT in the HBeAg (+) group (185.14 ± 220.28 U/L and 216.86 ± 435.07 U/L) are higher than in the HBeAg (-) group (156.38 ± 240.52 U/L and 150.42 ± 289.34 U/L), but the difference is not statistically significant (p>0.05). Similarly, there is no significant difference in bilirubin (71.05 ± 157.98 µmol/L vs 57.40 ± 96.69 µmol/L, p=0.605) and albumin (28.19 ± 5.81 g/L vs. 29.35 ± 6.57 g/L, p=0.454) between the two groups. Our results are somewhat similar to the study by author Le Thi Thuy (2016) with (p>0.05) [9] although the research subject is hepatitis B. This suggests that AST, ALT, bilirubin, albumin are not related to HBeAg and can be maintained from the stage of hepatitis B until the disease progresses to cirrhosis. However, further studies are needed to further define this relationship.

CONCLUSION

The average age of the study subjects is 61.68 ± 11.44, of which 60% are male. Biochemical and virological indices show significant liver damage with avearge AST of 161.42 ± 236.46 U/L, ALT of 162.05 ± 318.43 U/L, bilirubin of 59.79 ± 109.18 µmol/L, albumin of 29.15 ± 6.43 g/L. The average value of HBV-DNA is 5.88 ± 2.37 log10 copies/mL, HBsAg concentration is 3.30 ± 0.46 log10 IU/mL and HBeAg(+) rate in the study is 17.5%.

Data analysis shows that there is no statistically significant association between age, genders and HBV-DNA load, HBsAg concentration or HBeAg status (p>0.05). However, the study results show that there is a correlation between the group of patients with increased AST, ALT, bilirubin and decreased albumin with HBV-DNA concentration (p<0.05) but it is not related to HBeAg (p>0.05). Besides, AST and albumin also record a correlation with HBsAg concentration (p<0.05). In particular, HBV-DNA and HBsAg are closely related to each other (p=0.001), confirming the close relationship between viral load and surface antigen. In addition, the rate of HBeAg (+) is also related to HBV-DNA concentration (p=0.007). However, there is no statistically significant difference in HBsAg levels between the HBeAg-positive and -negative groups (p=0.974), suggesting that HBsAg may be independent on HBeAg status in patients with chronic hepatitis B with cirrhosis.

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