

Serum Aminotransferase Enzymes and Hepatitis B Infection in ESRD Hemodialysis Patients at Ratchaburi Hemodialysis Centers

ระดับเอนไซม์ aspartate and alanine aminotransferase และการติดเชื้อไวรัสตับอักเสบชนิดบี ในผู้ป่วยไตวายระยะสุดท้ายที่ได้รับการฟอกเลือดที่โรงพยาบาลราชบุรี

สมบูรณ์ อภิชัยยิ่งยอด พ.บ.

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ABSTRACT

Objective : To evaluate host factor and virologic factor on serum aspartate aminotransferase (AST) and alanine aminotransferase among ESRD patients on maintenance hemodialysis compared to healthy control subjects

Design : A cross-sectional study were done on 69 chronic hemodialysis patients and 93 healthy controlled subjects.

Material and method : Blood samples was collected for AST, ALT, HBsAg and antiHBsAb. In blood samples that HBsAg showed positive result will send to determine HBeAg and antiHBeAb.

Results : ESRD hemodialysis patients had serum aminotransferase activity significantly lower than healthy control group ; AST 19.87 ± 13.24 IU/L vs. 28.09 ± 26.63 IU/L ($p = 0.001$) and ALT 28.88 ± 17.44 IU/L vs. 50.27 ± 34.11 IU/L ($p = 0.000$). In the subset of ESRD hemodialysis patients, we had nine patients who were HBsAg positive and two patients who had both HBsAg and HBeAg positive. HBsAg positive hemodialysis group had mean AST and ALT higher than HBsAg negative hemodialysis group ; AST 26.22 ± 12.39 IU/L vs. 18.92 ± 13.20 IU/L and ALT 36.89 ± 22.58 IU/L vs. 27.68 ± 16.44 IU/L respectively. HBsAg positive and HBeAg positive hemodialysis group had mean AST and ALT higher than HBsAg positive and HBeAg negative hemodialysis group ; AST 34 ± 31.11 IU/L vs 24 ± 4.16 IU/L and ALT 60 ± 42.43 IU/L vs. 30.29 ± 12.28 IU/L.

Conclusion : ESRD patients that on maintenance hemodialysis have decreased aminotransferase

activity compared with the general population. AST and ALT levels in ESRD patients were highest in HBsAg positive and HBeAg positive group. Because serum aminotransferase levels are commonly used to screen for liver disease in the dialysis population, recognition of liver damage may be hampered by the reduction in aminotransferase values in these patients.

Keywords : AST, ALT, HBsAg, antiHBsAb, HBeAg, antiHBeAb

บทคัดย่อ

ได้ศึกษาถึงระดับของเอนไซม์ aspartate aminotransferase (AST) และ alanine aminotransferase (ALT) ในเลือดของผู้ป่วยไตวายเรื้อรังระยะสุดท้ายจำนวน 69 คนที่ได้รับการฟอกเลือดที่โรงพยาบาลราชบุรีเปรียบเทียบกับกลุ่มควบคุมจำนวน 93 คน ที่มาตรวจสุขภาพประจำปีที่โรงพยาบาลราชบุรี เป็นการวิจัยเชิงวิเคราะห์ ณ เวลาหนึ่ง ผลที่ได้พบว่าระดับของเอนไซม์ AST และ ALT ในผู้ป่วยมีค่าต่ำกว่าในกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ในกลุ่มผู้ป่วยที่มี HBsAg positive และ HBeAg positive จะมีค่าเฉลี่ยของระดับ AST และ ALT สูงกว่าเมื่อเปรียบเทียบกับผู้ป่วยกลุ่มอื่น

Introduction

Control of spread of HBV infection in hemodialysis unit has been one of the major advanced in managing ESRD patients. Patients with chronic HBV, however, continue to enter population pool of dialysis patients. In the hemodialysis population, the prevalence of hepatitis B surface antigen positivity is likewise 10–15%.⁸ Serum aminotransferase, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are frequently used to screen for liver disease in the general population as well as in hemodialysis patients. Although one early report² found normal AST level in renal failure and HD patients, AST had been repeatedly shown to be decreased in these patients thereafter.¹⁻⁴ On the other hand, although ALT reflects hepatocyte damage better than AST, there was only few reports showing ALT to be unchanged in renal failure patients, while it had never been adequately studied in hemo-

dialysis population. This study therefore aimed to compare serum aminotransferase activity in healthy control subject and in patients undergoing long-term hemodialysis. In hemodialysis group, virologic factors had also studied to determine its effect on serum aminotransferase activity.

Subject and Method

This is a cross-sectional study of 69 ESRD patients who received maintenance hemodialysis in Ratchaburi hemodialysis center and 93 subjects who came to yearly check up at Ratchaburi hospital. In both group no subjects were alcoholism or take hepatotoxic drugs. Age, sex, serum aspartate aminotransferase and alanine aminotransferase level, HBsAg and antiHBsAb were done in all subjects of both groups. In subject who had HBsAg positive will further study for HBeAg and antiHBeAb. Values of serum aspartate and alanine aminotransferase were

shown as mean \pm SD and statistic analyzed by t-test. Statistical significance was assumed for p-value < 0.05 . In this study, the normal cut off valued for AST and ALT were 37 and 65 IU/L respectively. HBsAg, antiHBsAb, HBeAg and antiHBeAb were shown as positive or negative result.

Results

There were 93 control subject and 69 hemodialysis patients include in this study. None of 93 control subjects had HBsAg positive. 9 out of 69

hemodialysis patients had HBsAg positive and only 2 patients had both HBsAg and HBeAg positive. In both group they had age and sex match by sign test. Every persons in this study did not chronic alcoholic or take hepatotoxic drug prior to this study. Mean age in control group was 53.33 years and in hemodialysis group was 55.39 years. 48/93 and 39/69 subject in control and hemodialysis group were male. Serum aspartate and alanine aminotransferase levels in each group were shown in tables 3-5.

Table 1 Age and sex characteristic of control and hemodialysis (HD) groups

	Control (n = 93)	HD (N = 69)	p-value
Age (yrs) mean \pm SD	53.33 \pm 5.57	55.39 \pm 13.76	.244
Sex (M/F)	48/45	39/30	.513

Table 2 Hepatitis B virologic status of control and HD groups

	Control (n = 93)	HD (n = 69)
HBsAg \pm	0/93	9/60
HBsAg + / HBeAg+	0	2
HBsAg + /HBeAg-	0	7

Table 3 Serum AST and ALT in control and hemodialysis group

Liver enzyme (IU/L)	ESRD (n = 69)		Control (n = 93)		t	p-value
	mean	SD.	Mean	SD.		
AST	19.87	13.24	28.09	26.63	2.58	.011
ALT	28.88	17.44	50.27	34.11	5.2	.000

Table 4 Serum AST and ALT in HBsAg positive and HBsAg negative hemodialysis group

Liver enzyme	HBsAg	N	Mean	Std. Deviation	Std. Error Mean
AST (IU/L)	negative	60	18.92	13.20	1.7
	positive	9	26.22	12.39	4.13
	negative	60	27.68	16.44	2.12
ALT (IU/L)	positive	9	36.89	22.58	7.53

Table 5 Serum AST and ALT level in HBsAg positive and HBsAg negative hemodialysis group

Liver enzyme	HBsAg	N	Mean	Std. Deviation	Std. Error Mean
AST (IU/L)	negative	7	24.00	4.16	1.57
	positive	2	34.00	31.11	22.00
	negative	7	30.29	12.28	4.64
ALT (IU/L)	positive	2	60.00	42.43	30.00

Discussion

HBV infection remains frequent in dialysis population. The prevalence of HBsAg positive in our hemodialysis group was 13.04%. Serum aminotransferase is an important tool in screening for liver disease in these patients. The reduction in aminotransferase values in dialysis patients was mentioned previously in some reports³⁻⁵ but it had occasional been adequately studied in hemodialysis population. The main aim of this study is to clarify whether serum aminotransferase levels are decreased in ESRD patients that on maintenance hemodialysis. We found that aminotransferase activity is lower in

hemodialysis group than healthy individual even after adjusting for age and sex. In hemodialysis group, we found that in patients with HBsAg positive and HBeAg positive had higher aminotransferase value when compared to other patients. But due to small number of case (2/69) which had both HBsAg positive and HBeAg positive, we can not statistically analyze the impact of virologic factor on aminotransferase activity. In both hemodialysis and healthy control groups had mean serum AST and ALT below the upper normal limit (37 IU/L for AST and 65 IU/L for ALT). The exact mechanism of decreased serum aminotransferase levels in dialysis

patients remained uncertain, though some had postulated that reduction in pyridoxine, a coenzyme of transaminases, might be the leading cause.^{4,5} Suppression of AST and ALT synthesis in hepatocyte and inhibition of AST and ALT release from hepatocyte into the bloodstream or accelerated clearance from serum have been suggested to have a role.¹⁻¹⁶ In the future it may need further study to revise normal cutoff value of AST and ALT in ESRD hemodialysis patients.

Summary

This study shows that serum aminotransferase level in ESRD hemodialysis patients are lower in comparison to healthy individuals. Normal cutoff value for AST and ALT that used for general population may be not suitable to detect early liver damage in ESRD patients.

Acknowledgment

The author wishes to thank dialysis nurse staff who submitted material and thank for their assistance.

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