Hepatitis A and B Discrimination According to Aminotransferases

Aminotransferazlara Göre Hepatit A ve B Enfeksiyonu Ayrımı

Aslınur Özkaya Parlakay[1], Ateş Kara[1], İlker Devrim[2], Ali Bülent Cengiz[1], Sevilay Karahan[3], Mehmet Ceyhan[1]

[1]Department of Pediatric Infectious Diseases, Medical Faculty, Hacettepe University, Sıhhiye, *Ankara, Turkey*

[2]Department of Pediatric Infectious Diseases, Behçet Uz Research Hospital, *İzmir, Turkey*

[3]Department of Biostatistics, Medical Faculty, Hacettepe University, Sıhhiye, *Ankara, Turkey*

Abstract

Objective: Acute infection of hepatitis A and B viruses is accompanied by biochemical evidence of liver injury. In acute symptomatic hepatitis, transaminase tests are markedly elevated, especially, in hepatitis A. This study was carried out to examine the feasibility of discrimination between hepatitis A and B in acute phase using serum transaminase concentrations so as to take isolation precautions and to plan supportive therapy in early phase.

Methods: Between January 1996 and December 1998, 444 patients, [239 (53.8%) males and 205 (46.2%) females] are tested for hepatitis B surface antigen (HBsAg), hepatitis B core IgM antigen (anti-HBc IgM), and hepatitis A immunglobuline M (anti-HAV IgM), alanine aminotransferase (ALT), aspartat aminotransferase (AST) and bilirubin concentrations and comparison of transaminase concentrations between patients infected with hepatitis A and hepatitis B has been made.

Results: ALT concentrations of HAV-infected patients had a median of 879 (minimum: 4, maximum: 7201), whereas HBV-infected patients had a median of 66 (minimum: 16, maximum: 3118). AST concentrations of HAV-infected patients had a median of 492 (minimum: 8, maximum: 5718), whereas HBV-infected patients had a median of 59,5 (minimum: 13, maximum: 2040). Transaminase concentrations of patients infected with hepatitis A are higher than patients infected with hepatitis B (for ALT and AST p<0,001). Also there was difference in transaminase concentration in acute hepatitis with age. Concentrations of serum transaminases in acute hepatitis increased with age and peaked at 7-8 years, having a median of 1565 (minimum: 9 and maximum: 4014) for AST and 1942 (minimum: 22 and maximum: 3950) for ALT.

Conclusion: Discrimination between hepatitis A and B in acute phase using serum transaminase concentrations could be helpful to get isolation precautions and to plan supportive therapy in early phase.

(J Pediatr Inf 2011; 5: 1-3)

Anahtar kelimeler: Hepatitis, aminotransferases, child

Özet

Amaç: Hepatit A ve B virüslerinin neden olduğu akut hepatit tablosuna, biyokimyasal karaciğer hasarı eşlik eder. Akut semptomatik hepatit enfeksiyonunda, özellikle Hepatit A enfeksiyonunda, transaminaz düzeyleri belirgin olarak artar. Bu çalışma akut dönemde serum transaminaz düzeylerinin ölçümüyle hepatit A ve B enfeksiyonu ayrımı yapılarak, erken dönemde izolasyon önlemlerinin alınması ve destekleyici tedavinin verilmesinin önemini araştırmak amacıyla planlanmıştır.

Yöntemler: Ocak 1996 ve Aralık 1998 yılları arasında (Hepatit B aşısının aşı takvimine dahil edilmesinden önce) akut hepatit şüphesiyle başvuran 239 erkek (%53.8), 205 kız (%46.2) toplam 444 hastanın hepatit B yüzey antijeni (HBsAg), hepatit B kor Ig M antikoru (anti-HBc Ig M), hepatit A Ig M antikoru (anti-HAV Ig M), alanin aminotransferaz (ALT), aspartat aminotransferaz (AST) ve bilirübin düzeyleri ölçülerek akut hepatit tablosunun nedeninin hepatit A veya B enfeksiyonu olmasına göre karşılaştırılması yapılmıştır.

Bulgular: Hepatit A enfeksiyonu saptanan vakaların ALT düzeylerinin medyanı 879 (minimum: 4, maksimum: 7201) iken, HBV enfeksiyonu olan vakaların ALT düzeylerinin medyanı 66 (minimum: 16, maksimum: 3118) olarak saptanmıştır. Hepatit A enfeksiyonu olan vakaların AST düzeylerinin medyanı (minimum: 8, maksimum: 5718)iken, HBV enfeksiyonu olan vakaların medyanı 59,5 (minimum: 13, maksimum: 2040) olarak belirlenmiştir. Hepatit A enfeksiyonu geçiren hastaların transaminaz düzeylerinin hepatit B enfeksiyonu geçiren hastalara kıyasla daha yüksek olduğu saptanmıştır (ALT ve, AST için p<0,001). Sadece iki hepatit B enfeksiyonu vakasının ortalama ALT ve AST değerlerinin hepatit A enfeksiyonu ortalama transaminaz değerlerinden yüksek olduğu gözlenmiştir. Ayrıca transaminaz düzeylerinin yaşla arttığı, 7-8 yaş civarında pik yaparak medyan AST düzeyinin 1565 (minimum: 9 ve maksimum: 4014)'e, medyan ALT düzeyinin ise 1942 (minimum: 22 ve maksimum: 3950)'ye yükseldiği saptanmıştır.

Sonuç: Akut dönemde serum transaminaz düzeylerinin ölçümüyle hepatit A ve B enfeksiyonu ayrımı yapılarak, erken dönemde izolasyon önlemlerinin alınabilmekte ve destekleyici tedavi verilebilmektedir.

(J Pediatr Inf 2011; 5: 1-3)

Key words: Hepatit, aminotransferazlar, çocuk

Geliş Tarihi: 18.05.2010
Kabul Tarihi: 14.12.2010

Correspondence Address:
Yazışma Adresi:
Dr. Aslınur Özkaya Parlakay
Department of Pediatric Infectious Diseases, Medical Faculty, Hacettepe University, Sıhhiye, 06100
Ankara, Turkey
Phone: +90 312 305 11 66
Fax: +90 312 212 10 49
E-mail: aslinur@hacettepe.edu.tr

doi:10.5152/ced.2011.01

Introduction

Hepatitis A, a naked RNA virus, is a member of Picornaviridae family Hepatovirus genus, transmitted via the fecal-oral route. Prevalance is generally parallel to age and socioeconomic level. Hepatitis A is more commonly encountered in childhood in developing countries. According to WHO data and seroprevalence studies, hepatitis A infection has an intermediate seropositivity in Turkey, regarding HAV seroprevalance (1).

Hepatitis B, a member of the Hepadnaviridae family, is a small DNA virus with unusual features similar to those of retroviruses. HBV replicates through an RNA intermediate and can integrate into the host genome. The unique features of the HBV replication cycle confer a distinct ability of the virus to persist in infected cells. HBV infection has an insidious course, with an incubation period of 60-80 days, and is usually asymptomatic in 80% of cases. However it may also lead to a wide spectrum of liver disease ranging from acute (including fulminant hepatic failure) to chronic hepatitis, cirrhosis, and hepatocellular carcinoma (2).

Clinical and routine laboratory evaluation is not helpful for differentiating symptomatic hepatitis etiology. Clinical presentation of hepatitis includes jaundice, fatigue, anorexia, tiredness, muscular pain, and,rarely, rash.

After the neonatal period, differential diagnosis of jaundice is a challenging situation for the clinician. Routine tests, especially ALT and AST could be very helpful to predict the etiology. We retrospectively collected data to analyse the concentration of transaminases in acute symptomatic hepatitis A and B cases to evaluate the predictive value of concentration of transaminases to discriminate between hepatitis A and B.

Material and Methods

From January 1996 through December 1998 (before the incorporation of hepatitis B vaccine in the vaccination schedule), 445 patients, who were suspected of having acute hepatitis and tested for HBsAg, anti-HBc IgM, and anti-HAV Ig M bilirubin, ALT, and AST were included and data were collected retrospectively. As the number of patients with hepatitis, especially hepatitis B, has decreased significantly after 1997, with the implementation of hepatitis B vaccine in routine immunisation schedule, the study was conducted in 1996-1998. In order to analyse hepatitis B cases, we would prefer to observe at least 3 cases per year.However, after 1999, there was either only one case or no acute hepatitis B cases. Therefore, we enrolled no hepatitis cases after December 1998. Mann-Whitney u test was used for biostatistics. As descriptive statistics mean, minimum and maximum values are used.

Results

Of the 444 patients, 239 (53.8%) were males and 205 (%46.2) were females, whose age varied between 1-25 years, with a mean of 9.12±3.85 (Distribution of Hepatitis and ALT, AST concentrations is summarized in Figure 1).

Acute viral hepatitis was serologically diagnosed in 440 patients, of which 416 (94.5%), 24 (5.5%) had HAV and HBV infections, respectively. Four patients had hepatitis not caused by HAV or HBV. Of the patients infected with HAV, 222 were male and 194 were female. There were 13 males and 11 females with HBV infection.

ALT concentrations of HAV-infected patients had a median of 879 IU/ml (minimum: 4 IU/ml, maximum: 7201 IU/ml), whereas HBV-infected patients had a median of 66 IU/ml (minimum: 16 IU/ml, maximum: 3118 IU/ml). AST concentrations of HAV-infected patients had a median of 492 IU/ml (minimum: 8 IU/ml, maximum: 5718 IU/ml), whereas HBV-infected patients had a median of 59,5 IU/ml (minimum: 13 IU/ml, maximum: 2040 IU/ml). Concentrations of serum transaminases, increasing with age and peaking at 7-8 years, had a mean of 1565 (minimum: 9 and maximum: 4014) for AST and 1942 (minimum: 22 and maximum: 3950) for ALT (Distribution of hepatitis A and B according to age groups and distribution of ALT and AST in hepatitis A and B due to age groups is summarized in Table 1 and 2 respectively).

Table 1. Distribution of hepatitis A and B according to age groups

AGE GROUPS	HEPATITIS A	HEPATITIS B
1y-2y	8	2
3y-4y	41	1
5y-6y	61	6
7y-8y	84	5
9y-10y	77	3
11y-12y	67	1
13y-16y	80	6
17y-25y	10	-

Table 2. Distribution of ALT and AST in hepatitis A and B due to age groups

	HEPATITIS A		HEPATITIS B	
AGE GROUPS	MEAN ALT	MEAN AST	MEAN ALT	MEAN AST
1-2	1661	845	47	80
3-4	996	900	173	187
5-6	1069	853	326	415
7-8	1251	1064	708	373
9-10	1000	847	838	740
11-12	1142	912	496	243
13-16	861	595	118	112
17-25	869	817	-	-

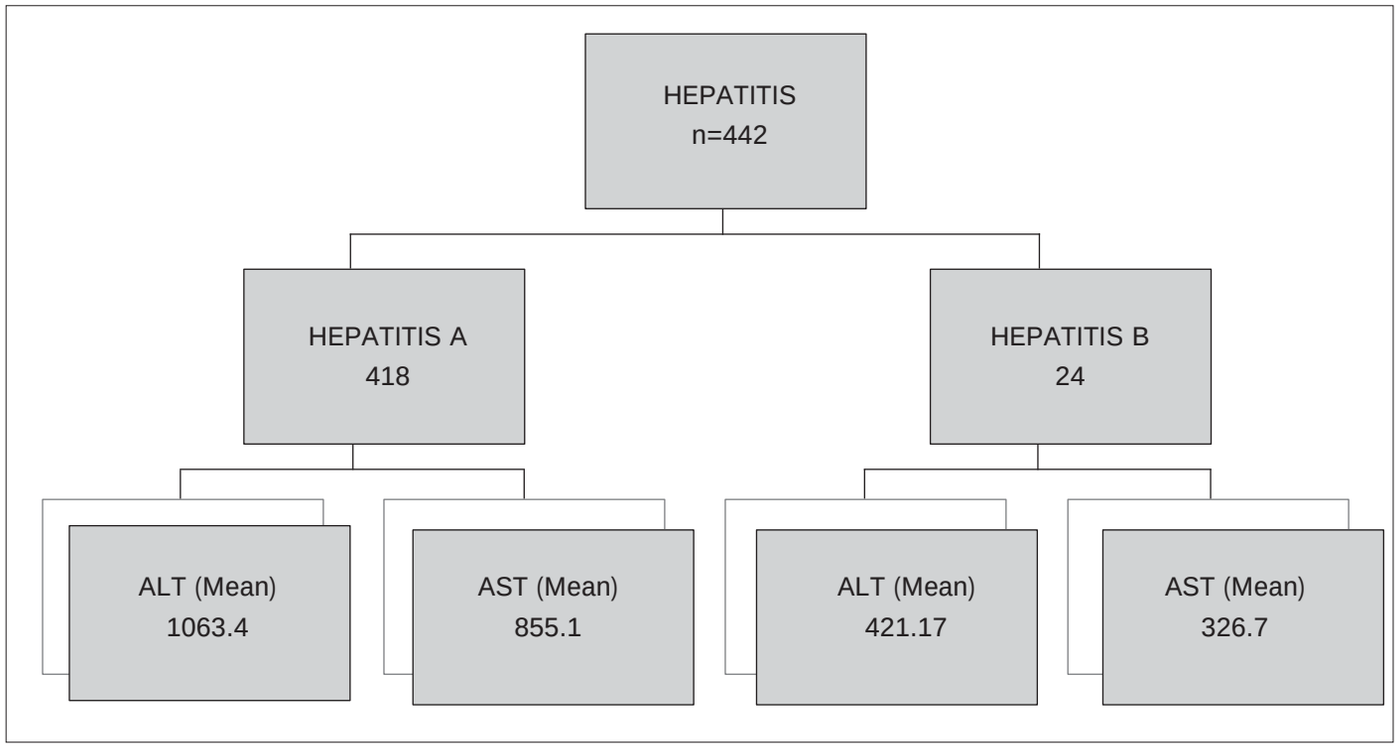

Figure 1. Distribution of Hepatitis and ALT, AST concentrations

In our study serum transaminases were higher in hepatitis A infection (for ALT and AST p<0.001).

Discussion

Acute infection caused by HAV and HBV is accompanied by biochemical evidence of liver injury. In acute symptomatic hepatitis, trasnaminase tests are markedly elevated (3,4). The concentrations of other enzymes such as lactic dehydrogenase (LD) and alkaline phosphatase (ALP) are usually only mildly increased. In one patient suspected of acute hepatitis, tests for serological markers of acute viral infection were ordered for confirmation and categorisation of viral etiology. Marked abnormalities of serum transaminases occur with HAV, but HBV may not be associated with elevated serum concentrations of transaminases (5).

Elevation of serum transaminases is a biochemical hallmark of hepatocellular injury. In acute symptomatic hepatitis, the rise in transaminase activity begins in the prodromal phase, preceding the onset of jaundice (6). ALT is found in cell cytoplasm and has a half life of 47±10 hours. AST is found both in cytoplasm and mitochondria and has a half life of 17±5 hours. Serum AST and ALT can be as high as 100 times the upper limit of normal (2). Serum ALT is usually slightly higher than the AST (7).

In our study serum transaminases were higher in hepatitis A infection compared to hepatitis B infection. Results also showed that transaminases increased with age, having a maximum peak around 7-8 years, and a slight fall was observed after these ages.

The results of our study show that serum transaminase concentrations were more elevated in HAV infection compared to hepatitis B infection. Only two of the acute HBV-infected patients have higher ALT and AST concentrations compared to the mean concentration of HAV-infected patients (ALT: 1063.4, AST: 855.1).

This study showed that serum transaminases could be used as a biochemical screen to discriminate between hepatitis A and B infections, to suggest postexposure and to take infection control precautions.

Conflict of Interest

No conflict of interest is declared by the author.

References

1. Available in World Health Organisation webpage. http://www.emro.who.int/emhj/1305/13_5_2007_1108_1113.pdf (accessed on May 6th, 2010).
2. Liang TJ. Hepatitis B: the virus and disease. Hepatology 2009; 49: 13-21.
3. Hoofnagle JH. Serodiagnosis of acute viral hepatitis. Hepatology 1983; 3: 267-8.
4. Kamath PS. Clinical approach to the patient with abnormal liver test results. Mayo Clin Proc 1996; 71: 1089-94.
5. Chitkara YK, Fontes MD. Guidelines for serological testing in the diagnosis of acute hepatitis A and B. Diagn Microbiol Infect Dis 1999; 33: 241-5.
6. Spearman CW. The laboratory diagnosis of acute viral hepatitis. S Afr Med J 1994; 84: 556-9.
7. Spearman CW. Clinical and biochemical features of acute viral hepatitis. S Afr Med J 1994; 84: 524-5.