

RESEARCH NOTE

ACUTE HEPATIC FAILURE AMONG HOSPITALIZED THAI CHILDREN

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Abstract. We conducted a hospital-based study from June 2002 to December 2006 of Thai children aged 1-15 years with acute hepatic failure (AHF) to determine the causes and outcomes. Eleven children were included in the study. Hepatitis B virus was the cause of AHF in one child, infection-associated hemophagocytic syndrome was the cause in 1 child, Wilson's disease was the cause in 1 child and dengue fever was suspected to be the cause in 2 children. In 6 children the cause of AHF was unknown. Jaundice was reported in 9 of 11 children. Ten of 11 children had mild to moderate encephalopathy on admission. Five of 11 children died due to AHF. No liver transplantations were performed among the children in this study. Further studies into the relationship between dengue infection and AHF are needed.

Keywords: acute hepatic failure, etiological agent, ELISA, hepatitis B virus, dengue

INTRODUCTION

Acute hepatic failure (AHF) is a rare but potentially fatal complication of various illnesses in children (Kelly, 2002). Acute hepatitis A and B infections have been reported to be the most common causes of AHF in children (Dhawan, 2008). The purpose of this hospital-based case series was to evaluate the causes and outcomes among Thai children aged 1-15 years with AHF.

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MATERIALS AND METHODS

This study was conducted from January 2002 to September 2005 at King Chulalongkorn Memorial Hospital, Bangkok, Thailand, a tertiary care hospital, among children aged 1-15 years diagnosed with AHF as determined by the medical records diagnostic code using the International Classification of Diseases (ICD) 10 code K72.0 from September 2005 to December 2006 using the case definition of AHF by the International Association for the Study of the Liver (Tandon *et al*, 1999). Written informed consent was obtained from the parent/guardian of child prior to enrolment in the study. The study was conducted according to the Good Clinical Practice guidelines (ICH, 1996) and the Declaration

Table 1
Encephalopathy among study subjects (N=11).

Characteristic	Severity of encephalopathy	<i>n</i>
No encephalopathy on admission		1
Encephalopathy on admission		10
	Grade 1	7
	Grade 2	2
	Grade 3	1
	Grade 4a	-
	Grade 4b	-

n = number of children in a given category

Grade 1, child was confused and had mood changes; Grade 2, child was drowsy and displayed inappropriate behavior; Grade 3, child was stuporous but obeyed simple commands; Grade 4a, child was comatose but arousable by simple commands; Grade 4b, child was in a deep coma and did not respond to stimuli.

of Helsinki. Data analysis was conducted using Statistical Analysis System version 9.1 (SAS, SAS Institute, Cary, NC).

RESULTS

Eleven children with AHF were enrolled in the study with a mean age (\pm SD) of 8.2 (\pm 4.47) years and a range of 1-14 years. Six of the 11 children were females.

On physical examination 10 of the children had mild to moderate encephalopathy on admission (Table 1). Jaundice was present in 9 of the 11 children.

The etiology of AHF is unknown in 6 of the 11 children. One child tested positive for hepatitis B surface antigen (HBsAg) and anti-hepatitis B core antigen (anti-HBc IgM). Children tested for anti-hepatitis A virus (anti-HAV IgM), anti-hepatitis C virus (anti-HCV), anti-delta IgG and IgM and anti-hepatitis E virus (anti-HEV) were all negative (Table 2). The results of other laboratory tests are shown in Table 3. The other causes for AHF were infection-associated hemophagocytic syndrome (*n*=1), Wilson's disease (*n*=1) and dengue infection (*n*=2). Five children developed hepatic coma and died due to

shock or bleeding (Table 4).

Six children recovered and were discharged from the hospital. No liver transplantations were performed in any of the children in this study.

DISCUSSION

AHF is a rare, critical complication of various diseases in children. The mortality rate was 45% (5/11) in this case series. Various etiological factors can cause AHF in children. The etiology of AHF was unknown in 55% (6/11) of the children in this study, despite careful investigations. Hepatitis B virus (HBV) is no longer considered a main cause of AHF among children in Thailand due to socio-economic improvements and good coverage with hepatitis B vaccination (Poovorawan *et al*, 2006).

The results of this study may not be applicable to other populations. Laboratory testing for viral hepatitis and other etiologies was not conducted in all 11 of the children in this study. Hepatitis B and dengue infections were important causes of AHF in this study. Further investigations are needed to better understand the

Table 2
Viral laboratory findings among study subjects (N=11).

Tests	Categories	Total (N=11)		
		<i>n</i> (%)	S +	S -
Anti-HAV IgM	Test done	11 (100)	-	11
HBsAg	Test done	11 (100)	1	10
Anti-HBc IgM	Test done	10 (90.9)	1	9
	Test not done	1 (9.1)		-
Anti-HCV	Test done	8 (72.7)	-	8
	Test not done	3 (27.3)	-	-
Anti-delta IgG	Test done	5 (45.5)	-	5
	Test not done	6 (54.5)	-	-
Anti-delta IgM	Test done	5 (45.5)	-	5
	Test not done	6 (54.5)	-	-
Anti-HEV IgM	Test done	5 (45.5)	-	5
	Test not done	6 (54.5)	-	-

HAV, hepatitis A virus; HBsAg, hepatitis B surface antigen; HBc, hepatitis B core antigen; HEV, hepatitis E virus; *n* (%), number (percentage) of children in a given category; S+, number of children positive for each test; S-, number of children negative for each test.

Table 3
Other laboratory findings among study subjects (N=11).

Tests	<i>n</i>	Pos
Anti-CMV IgG	4	2
Anti-CMV IgM	3	1
EB virus Anti-Viral Capsid Antigen IgG	3	2
EB virus Anti-Viral Capsid Antigen IgM	3	1
Dengue fever serology IgG	4	2
Dengue fever serology IgM	4	2
Anti-smooth muscle antibody	3	2*

n, total number of children for whom the test was done; Pos, number of children for whom the test result was positive; IgG, immunoglobulin G; IgM, immunoglobulin M; CMV, cytomegalovirus; EB, Epstein-Barr

* Only one patient was positive. The other patient had a false positive and results but had Wilson's disease.

role of dengue infection as a cause of AHF in children.

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Table 4
Causes of acute hepatic failure and death among study subjects.

Children who died	Etiology	Cause of death
1	Unknown	Shock, bleeding
2	Hemophagocytic syndrome	Shock, bleeding
3	Dengue infection	Pulmonary hemorrhage
4	Unknown	Brain edema, shock
5	Unknown	Gastrointestinal bleeding
Children who survived	Etiology	Outcome
6	Unknown	Discharged with recovery
7	Unknown	Discharged with recovery
8	Unknown	Discharged with recovery
9	HBV	Discharged with recovery
10	Wilson's disease	Discharged with recovery
11	Dengue infection	Discharged with recovery

HBV, hepatitis B virus

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Conflicts of interest

Fakrudeen Shafi, Irving Boudville, Yanfang Liu, Yanee Hutagalung and Hans L Bock were employees of GlaxoSmithKline at the time of this study. Yong Poovorawan and Voranush Chongsrisawat declare they have no conflicts of interest.

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