LIVER FUNCTION TESTS OF PATIENTS WITH DENGUE FEVER, DENGUE HEMORRHAGIC FEVER AND DENGUE SHOCK SYNDROME IN TROPIC AND INFECTIOUS DISEASE WARD IN THE DEPARTMENT OF INTERNAL MEDICINE, DR. SOETOMO HOSPITAL, SURABAYA

Aidil Ario Darmawan[1], Bramantono[2], Aryati[3]
[1]Medical Doctor Program, [2]Department of Internal Medicine, [3]Department of Clinical Pathology,
Faculty of Medicine, Universitas Airlangga, Dr. Soetomo Hospital

ABSTRAK

Pada infeksi virus dengue, kadar serum glutamate-oxaloacetate transferase (SGOT) dan serum glutamate-pyruvate transferase (SGPT) dapat berubah. Tujuan penelitian ini adalah untuk mengetahui peran lanjut SGOT dan SGPT dalam infeksi virus demam berdarah Dengue di Dr. Soetomo Hospital, Surabaya demi memberikan pelayanan yang lebih baik. Penelitian ini merupakan penelitian deskriptif dimana data dikumpulkan dari catatan medis pasien dengan demam dengue, demam berdarah dengue dan sindrom syok dengue dari 1 Agustus 2010-31 Mei 2011. 162 catatan medis dinyatakan memenuhi syarat untuk penelitian. Nilai rata-rata SGOT di demam dengue adalah 83,92 IU/L (12,2-472 IU/L); SGPT 69,47 IU/L (11 - 115,8 IU/L). Untuk demam berdarah dengue, nilai rata-rata SGOT adalah 156,86 IU/L (16-4014 IU/L); SGPT 104,99 IU/L (8-2574 IU/L). Perbedaannya adalah pada sindrom syok dengue yang SGOT dan SGPT-nya menjadi yang tertinggi. Nilai rata-rata SGOT adalah 57,5 IU/L (34-103 IU/L); SGPT 49,25 IU/L (26-65 IU/L). ***(FMI 2015;51:114-117)***

Kata kunci: *Demam dengue, demam berdarah dengue, sindrom syok dengue, SGOT dan SGPT*

ABSTRACT

In dengue viral infection, the value of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) could change. This research is a descriptive study where the data were collected from medical records of patient with Dengue Fever, Dengue Hemorrhagic Fever and Dengue Shock Syndrome from August 1st 2010-May 31th 2011 in The Department of Internal Medicine, RSUD Dr. Soetomo, Surabaya. 162 medical records were qualified for the research. The average value of AST in Dengue Fever is 83.92 IU/L (12.2-472 IU/L); ALT 69.47 IU/L (11-115.8 IU/L). For Dengue Hemorrhagic Fever, the average value of AST is 156.86 IU/L (16-4014 IU/L); ALT 104.99 IU/L (8-2574 IU/L). The difference is in Dengue Shock Syndrome which AST and ALT should be the highest. The average value of AST is 57.5 IU/L (34-103 IU/L); ALT 49.25 IU/L (26-65 IU/L). ***(FMI 2015;51:114-117)***

Keywords: *Dengue fever, dengue hemorrhagic fever, dengue shock syndrome, AST and ALT*

Correspondence: Aidil Ario Darmawan, Faculty of Medicine, Universitas Airlangga, Jalan Prof. Dr. Moestopo 47, Surabaya 60131, Indonesia.

INTRODUCTION

Dengue Virus Infection is a dangerous infectious disease. The disease is commonly found in endemic countries such as Thailand, Myanmar, Sri Lanka, and India. Indonesia is also an endemic country with the highest dengue cases (WHO 2009). In 2007, when 35% of the population live in urban areas, it is recorded that 150.000 cases of dengue occur and 25.000 of the cases occurred in Jakarta and West Java. In 2008, the incidence of dengue viral infection in East Java reaches as many as 16.589 people where 165 people died. While in Surabaya, the incidence reaches 2.145 cases and 10 people died. The incidence in East Java was 44.68 per 100.000 population with CFR (Case Fatality Rate) 0.99% while in Surabaya the incidence was 75.50 per 100.000 population with CFR 0.47% (Widijatmoko 2009).

Based on its clinical manifestations (WHO 2001), dengue is divided into three types, namely Dengue Fever, Dengue Hemorrhagic Fever, and Dengue Shock Syndrome. The three of them have different symptoms. Dengue Fever is characterized by fever of 39oC to 40oC which lasts for 2 to 7 days, headache, muscle aches, joint pain, leucopenia, skin rash. Dengue Hemorrhagic Fever is characterized by nausea, vomiting, leucopenia, positive tourniquet test, lethargy, enlarged liver > 2 cm, and increased hematocrit which is accompanied by decrease in platelet count (thrombocytopenia), while the Dengue Shock Syndrome is characterized by plasma leakage that causes fluid accumulation shock with respiratory distress, impaired consciousness, and disruption of the heart and other organs.

Along the course of the infection, the liver is one of the organs whose functions could be impaired during the

time dengue virus is still active in the patient's body (Itha et al 2005). The level of liver dysfunction is determined by the degree of severity of dengue. AST and ALT are liver aminotransferase enzymes involved in amino acid metabolism. Inflammatory process that occurs as a result of dengue virus causes lesions of hepatic parenchymal tissue so that the biomarkers are released into the bloodstream. In the acute phase of dengue virus infection, aminotransferase enzymes increase, and decrease again when the condition of the liver has recovered (Souza et al 2007). AST and ALT levels increase significantly in patients with dengue virus infection indicated by symptoms such as nausea and vomiting, bleeding manifestations or hepatomegaly on clinical examination, thrombocytopenia (≤ 100.000/ cu.mm) or increased hematocrit.

The purpose of this study is to determine the profile of the enzymes AST and ALT in patients with Dengue Fever, Dengue Hemorrhagic Fever and Dengue Shock Syndrome Inpatient Diseases Tropical and Infectious Disease's Ward of Dr. Soetomo Hospital in order to make better management and service.

MATERIALS AND METHODS

This study is a descriptive study using secondary data, i.e., data taken from the medical records of patients. Level of AST and ALT, blood pressure, symptoms and diagnosis were obtained from the medical record. The research was conducted between August 1st 2010-May 31th 2011, 162 eligible samples were obtained from medical records. Dengue Viral Infection diagnosis was made by the patient's treating physician. Patients were diagnosed with Dengue Fever, Dengue Hemorrhagic Fever or Dengue Shock Syndrome and treated at Tropical and Infectious Disease Ward, Dr. Soetomo Hospital. The data were then grouped in some criteria and depicted as diagram and table.

Table 1. Research variables, operational definition, and type of data

Research Variable	Operational Definition	Type of Data
a. Independent Variable AST and ALT Role of AST and ALT	Hepatic enzyme increased during dengue virus infection takes place. Normal levels of AST is < 36 IU/L. ALT is < 45 IU/L. Indicative of impaired hepatic function	Nominal
b. Dependent Variable Degree of Clinical manifestation	Dengue Fever: Fever 2-7 days, fever 39°C-40°C, headache, muscle aches, joint pain, retro orbital pain, skin rash, tourniquet test +/-. Leucopenia +/- Dengue Hemorrhagic Fever (WHO 1999) Degree of dengue fever (WHO 1999) Grade I: Fever accompanied by untypical clinical symptoms and the manifestation of bleeding which is a positive tourniquet test Grade II: The symptoms in the overall degree of DHF I, plus bleeding spontaneously, usually in the form of skin bleeding and or other bleeding manifestations Grade III: Circulatory failure, which is characterized by rapid and weak pulse, narrow pulse pressure (20 mmHg or less), or hypotension, marked by cold and moist skin, and the patient became anxious Grade IV: Severe shock (profound shock), the pulse cannot be felt and no measurable blood pressure NB; stage III and IV is known to Dengue Shock Syndrome	Ordinal

RESULTS

Table 2. Distribution of dengue fever patients by sex

Sex	Total	Percentage
Male	28	68.30%
Female	13	31.70%

Table 3. Percentage of ALT and AST in dengue fever patient

	Normal Level	%	Abnormal Level	%	No Data	%
AST	10	24.39%	28	68.29%	3	7.32%
ALT	21	51.22%	17	41.46%	3	7.32%

Table 4. Distribution of dengue hemorrhagic fever degree I and II patient according to sex

Sex	Total	Percentage
Male	67	57.26%
Female	50	42.74%

Table 5. Percentage of ALT and AST profile among Dengue Hemorrhagic Fever degree I and II patient

	Normal Level	%	Abnormal Level	%	No Data	%
AST	16	13.68%	90	76.92%	11	9.40%
ALT	58	49.57%	48	41.03%	11	9.40%

Table 6. Distribution Dengue Shock Syndrome patient according to sex

Sex	Total	Percentage
Male	3	75%
Female	1	25%

Tabel 7. Percentage of ALT and AST among Dengue Shock Syndrome patient

	Normal Level	%	Abnormal Level	%	No Data	%
AST	2	50%	2	50%	0	0%
ALT	2	50%	2	50%	0	0%

DISCUSSION

Dengue virus is a virus that can cause dengue disease. This virus causes a number of metabolic effects in the body such as decreased platelet and increased hematocrit. AST and ALT are metabolites in the body that is affected by the viral infection. It has become a particular interest for the researcher to conduct a descriptive study illustrating AST and ALT profiles on the viral infection. The differences found in the Dengue Fever study which Andajani (2009) mentioned that most of the Dengue Fever patients were women (57.50 %). Goh et al (1987) reported that the number of cases in Singapore were higher in male than in female with a ratio of 1.9:1. Gender had reported that there were significant differences between men and women (Andajani 2009). A result of this research is in accordance with the study by Andajani (2009) that the levels of AST and ALT are greater in Dengue Hemorrhagic Fever patients than patients with Dengue Fever. AST level also increased more prominently in dengue virus infection than the enzyme ALT because of the excessively damaged myocytes during dengue infection (Seneviratne 2005). Dengue Shock Syndrome mean results was different from the research by Andajani (2009). The results of this study had stated that Dengue Shock Syndrome average was lower than Dengue Fever grade I and II. Based on Andajani's research, increased levels of AST and ALT are highest in Dengue Shock Syndrome (Dengue Haemorrhagic Fever degrees III and IV). The result difference might be caused by the number of samples that is less in Dengue Shock Syndrome or caused by misdiagnosing.

In determining the diagnosis, classification of the name of the disease was obtained. The diseases classified as Dengue Fever based on the Medical Records Department, Dr. Soetomo Hospital are Dengue Fever, Dengue Fever with warning sign, Dengue Fever without warning sign, Probable Dengue and Dengue Fever Suspect. Diseases classified as Dengue Shock Syndrome are Dengue Shock Syndrome and Dengue Shock Syndrome Suspect. Dengue Shock Syndrome is included in the category Dengue Fever. The name of this new disease is suited with Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control 2009. In the guide, WHO (1999) classification is not used anymore because of the confusion in determining the diagnosis. Thus, two new criteria are created, namely Dengue ± warning signs and Severe Dengue.

According to Dengue guide 2009, Probable Dengue is a person who lived or traveled to endemic areas of dengue, has a fever and experiencing two of the following criteria: vomiting, rash aches and pains, positive tourniquet test, leucopenia and one of the signs of warning signs, include abdominal pain, persistent vomiting, clinical fluid accumulation, mucosal bleeding, lethargy and restlessness, enlargement of the liver more than 2 cm and increased hematocrit accompanied by rapid decrease in platelets. Patients who were diagnosed in dengue without warning signs can also turn into Severe Hemorrhagic so we should still be careful. Severe Dengue is divided into three criteria, that is Plasma Weight Leakage (Severe Plasma Leakage) which can lead to Dengue Shock Syndrome and fluid accumulation with respiratory distress, Heavy Bleeding (Severe Bleeding) evaluated by clinician and Severe Organ Involvement which is accompanied by increase in liver enzymes (AST and ALT) to more than equal 1000 IU/L, impaired consciousness, disruption of the heart and other organs. This study did not use the above criteria, but used the WHO criteria in 1999.

CONCLUSION

The mean levels of AST and ALT in patients with dengue fever was the lowest of all degrees. The mean levels of AST and ALT in patients with Dengue Hemorrhagic Fever was higher than in patients with Dengue Fever. The mean levels of AST and ALT in

patients with Dengue Shock Syndrome is not in accordance with existing theory that it should be the highest level.

REFERENCES

Andajani A (2009). Peran protein non struktural 1 terhadap gangguan fungsi hepar pada infeksi virus dengue. Dissertation. Universitas Airlangga, Surabaya, p 1-51

de Souza LJ, Nogueira RM, Soares LC, Soares CE, Ribas BF, Alves FP, Vieira FR, Pessanha FE (2007). The impact of dengue on liver function as evaluated by aminotransferase levels. Braz J Infect Dis 11, 407-410

Goh KT, Ng SK, Chan YC, Lim SJ, Chua EC (1987). Epidemiological aspects of an outbreak of dengue fever/dengue haemorrhagic fever in Singapore. Southeast Asian J Trop Med Public Health 18, 295-302

Itha S, Kashyap R, Krishnani N, Saraswat VA, Choudhuri G, Aggarwal R (2005). Profile of liver involvement in dengue virus infection. Natl Med J India 18, 127-130

Seneviratne SL, Malavige GN, de Silva HJ (2005). Pathogenesis of liver involvement during dengue viral infections. Trans R Soc Trop Med Hyg 100, 608-614

Widijatmoko TE (2009). Korelasi antara antigen NS1 dengue dengan jumlah trombosit pada demam berdarah dengue. Disertasi. Universitas Airlangga, Surabaya

World Health Organization (1999). Guidelines for treatment of Dengue Fever/Dengue Hemorrhagic Fever in Small Hospitals. Available from http://www.searo.who.int/LinkFiles/Dengue_Guideline-dengue.pdf. Accessed May 11, 2011

World Health Organization (2001). Pencegahan & Pengendalian Dengue & Demam Berdarah Dengue: Panduan Lengkap, Jakarta, EGC, p 4

World Health Organization (2009). Dengue: guidelines for diagnosis, treatment, prevention and control. Available from http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf. Accessed May 11, 2011