

DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRRHOSIS OF THE LIVER AT EFARINA HOSPITAL ETAHAM BERASTAGI

Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵.
(Universitas Efarina)^{1,3,4,5}
(University Of Strathclyde-UK)²

*Correspondence: sriwahyunitarigan21@gmail.com

Abstract

Cirrhosis of the liver is a condition in which the liver slowly deteriorates which continues over a long period of time (chronic). The cells and liver tissue that is damaged and then turned into scar tissue so that the function of the liver will progressively decrease. This research is an observational descriptive by using medical records of patients with liver cirrhosis at the Efarina Etaham Berastagi Hospital, in January-July 2019. The sample of the study is 25 samples. The results obtained by patients with liver cirrhosis highest proportion based on male sex (80%), based on age, age group 40-50 years (28%), 51-60 years (64%) Based on AST levels 21 respondents (84 %), Based on ALT levels of 22 respondents (88%). Conclusions from the results of the study, the examination should be done several times to get accurate results

Keywords: AST and ALT enzyme levels, liver cirrhosis

INTRODUCTION

The liver is the largest solid organ which is located in the upper right abdominal cavity. This organ has an important role because it is a regulator of all carbohydrate, protein and fat metabolism. Site of synthesis of various protein components, blood clotting, cholesterol, urea and other substances that are very vital. In addition, it is also a place for the formation and distribution of bile acids as well as a center for detoxification of toxins and destruction (degradation) of steroid hormones such as estrogen.

Cirrhosis of the liver is a condition in which the liver slowly experiences continuous damage over a long period of time (chronic). The damaged cells and liver tissue then turn into scar tissue so that liver function will progressively decrease.

Liver function tests or better known as liver panels or liver function tests are a group of blood tests that measure certain enzymes or proteins in your blood. Liver function tests are generally used to help detect, assess and monitor liver disease or damage. Usually if to monitor the condition of the liver, this test is done periodically. or it is also done when you have a risk of liver injury, when you have liver disease, or have certain symptoms.

In Indonesia, cirrhosis of the liver caused by hepatitis B virus infection is very high, namely: 13 million people, this is because Indonesia is a high endemicity country for hepatitis B. Indonesia is also the country with the third highest hepatitis B sufferer after China and India. It is estimated that at the University of North Sumatra, 3 out of 100 people in Indonesia, 10 of them have been infected with the hepatitis B virus (Ministry of Health, 2014).

According to the 2010 Global Burden Disease study, liver cirrhosis causes 31 million disabilities according to life years or Disability Adjusted Life Years (DALYs), or 1.2% of the world's DALYs and 2% of all deaths in the world in 2010 (Mokdad et al., 2014). Cirrhosis of the liver is included in the top 20 causes of death in the world, covering 1.3% of all deaths in the world and the top 5 causes of death in Indonesia (WHO, 2010).

Two kinds of aminotransferase enzymes that are often used in the clinical diagnosis of liver cell damage are Aspartate Aminotransferase (AST), which is called SGOT (Serum Glutamic Oxaloacetic Transaminase) and Alanine Aminotransferase (ALT), which is also called SGPT (Serum Glutamic Pyruvic Transaminase).

AST/SGOT is an enzyme that is mostly found in heart muscle and liver, some is found in skeletal muscle, kidney and pancreas. High enzyme release in serum indicates damage, especially to liver tissue. ALT/SGPT is an enzyme found primarily in liver cells that is effective in diagnosing hepatocellular damage. Because liver function in the body has multiple functions, liver function tests also vary according to what is to be assessed. And when liver cells or tissues are damaged, an SGOT (Serum Glutamic Oxaloacetic Transaminase) and SGPT (Serum Glutamic Piruvic Transaminase) examination can be performed. Both of these enzymes are present in the cells of the liver, heart muscle, kidney, skeletal muscle and brain

From the results of observations of the number of patients with cirrhosis of the liver at Efarina Etaham Berastagi Hospital within a period of 1 month. So the authors are interested in conducting research with the title "Description of Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) enzymes in patients with liver cirrhosis at Efarina Etaham Hospital Berastagi"

Research purposes

To determine the value of AST and ALT levels in the blood serum of patients with cirrhosis of the liver.

To determine the percentage increase in AST and ALT levels in patients with cirrhosis of the liver.

LITERATURE REVIEWS

Liver cirrhosis

Cirrhosis of the liver is a chronic and progressive liver disease, characterized by the formation of fibrous tissue (scars) and nodules (Black & Hawks, 2009). Cirrhosis results from hepatocellular necrosis. The reticulin support tissue collapses with connective tissue deposition, distortion of the vascular network, and nodular regeneration of the liver parenchyma. Cirrhosis represents the end stage of various liver diseases such as chronic and alcoholic hepatitis.

Aspartate Aminotransferase (AST)

SGOT (Serum Glutamic Oxaloacetic Transaminase) or also called AST (Aspartate Aminotransferase) is an enzyme found in heart and liver muscle, while in moderate

**DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRRHOSIS OF THE LIVER AT EPHARINA HOSPITAL
ETAHAM BERASTAGI**



Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵

concentrations it is found in skeletal muscle, kidney and pancreas. Low concentrations are found in the blood, unless there is cellular injury, then large amounts are released into the circulation. In cardiac infarction, SGOT/AST will increase after 10 hours and reach its peak 24-48 hours after the occurrence of infarction.

Alanine Aminotransferase (ALT)

SGPT (Serum Glutamic Pyruvic Transaminase) or also called ALT (Alanine Aminotransferase) is an enzyme that is found in many liver cells and is effective for diagnosing hepatocellular destruction. This enzyme is found in small amounts in cardiac muscle, kidney and skeletal muscle. In general, the value of the SGPT/ALT test is higher than the SGOT/AST in acute liver parenchymal damage, whereas in chronic processes the opposite is found (www.labkesehatan.blogspot.com)

Relationship of Liver Cirrhosis with AST & ALT Examination

In patients with cirrhosis of the liver, AST and ALT examinations are usually carried out. This aims to: determine inflammation that occurs in the body, high numbers are usually an indication of liver disorders. In patients with hepatitis, the ALT value is 20-50 times higher than in normal people. A high AST value indicates a muscle disorder in one part of the body.

Then do a liver function test in patients with cirrhosis of the liver, to check the performance of the liver. The liver function tests, namely AST and ALT, will be examined. Elevations of ast and alt enzymes to 300 U/L are not specific for liver disease alone. But if an increase of more than 1000 U/L can be found in liver disease caused by a virus, liver damage due to drugs In general, the ast test value is higher than alt in liver damage

METHODS

The type of research conducted was a descriptive observational study of AST and ALT examination in patients with cirrhosis of the liver.

The population in this study were all liver cirrhosis patients at Efarina Etaham Berastagi Hospital. The sample in this study was taken using a total sampling technique, in which all patients with cirrhosis of the liver were examined for AST and ALT.

Data Collection Techniques The type of data collected in this study is secondary data obtained by collecting patient medical records.

RESULTS AND DISCUSSION

Contents Results and Discussion

This research was conducted at Efarina Etaham Berastagi Hospital in January-July 2019, with a total sample of 25 people

**DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRROSIS OF THE LIVER AT EPHARINA HOSPITAL
ETAHAM BERASTAGI**

Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵



Pictures of Efarina Etaham Berastagi Hospital



Figure Examination of AST and ALT enzyme levels

Examination of AST and ALT enzyme levels using a BA 88A mindray tool. Examination of AST and ALT enzyme levels was carried out with the aim of seeing any damage to the liver.

Patients with cirrhosis of the liver who carry out examinations at Efarina Etahan Berastagi Hospital can be differentiated based on several characteristics, including

1. Characteristics Based on Gender
2. Characteristics Based on Age
3. Characteristics Based on AST Levels
4. Characteristics Based on ALT Levels

Characteristics Based on Gender

Table of Characteristics by Gender

Gender	Frequency	Percentage	Average AST Levels (U/L)	Average ALT Levels (U/L)
Man	20 People	80%	50 (U/L)	59 (U/L)
Woman	5 People	20 %	47 (U/L)	58 (U/L)
Amount	25 people	100 %		

**DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRROSIS OF THE LIVER AT EPHARINA HOSPITAL
ETAHAM BERASTAGI**



Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵

From the results of the research table, it was found that of the 25 respondents who were used as samples, there were 20 men with an average AST level of 50 U/L and an average ALT level of 59 U/L. Furthermore, there were 5 women with an average AST level of 47 U/L and an average ALT level of 58 U/L. The normal ALT level is 4-46 U/L. The results of the study showed that there were several patients who tested positive for cirrhosis of the liver.

Based on the results of the study, there were differences in AST levels and ALT levels based on gender characteristics between men and women in patients with cirrhosis of the liver at Efarina Etaham Berastagi Hospital. Risk factors for liver cirrhosis include the large number of men who consume alcohol/heavy alcohol drinkers.

This habit causes the existing disease to become more severe, especially in a person who already has Hepatitis B Virus infection which automatically accelerates liver damage / the occurrence of cirrhosis of the liver, whereas in women being overweight or obese can cause fat in the liver tissue and cause cirrhosis of the liver. .

Characteristics Based on Age

Table of Characteristics by age

Age	Frequency	Percentage	Average AST Level (U/L)	Average ALT levels (U/L)
40-50	7	28 %	49 (U/L)	55 (U/L)
51-60	16	64 %	49 (U/L)	61 (U/L)
> 61	2	8 %	52 (U/L)	59 (U/L)
	25	100 %		

Based on the results of the study, it was found that patients based on age characteristics had different levels of AST and ALT, where 7 respondents aged 40-50 years had an average level of AST 49 (U/L) and ALT 55 (U/L) 16 people Respondents aged 51-60 years had an average level of AST 49 (U/L) and ALT 61 (U/L) and 2 respondents aged > 61 years had an average level of AST 52 U/L and ALT 59 U/L . This shows that some of the respondents had cirrhosis of the liver where the normal levels of AST were 4-40 U/L and ALT 4-46 U/L.

The results of data analysis as in table 4: 2 show that there are significant differences in age. The prevalence of cirrhosis of the liver increases with age, because cirrhosis of the liver is a disease that attacks the productive age of life, so this condition will have an impact in the form of a decrease in the quality of life of affected patients, Nurdjanah (2009).

DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRROSIS OF THE LIVER AT EPHARINA HOSPITAL ETAHAM BERASTAGI



Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵

Characteristics Based on AST Levels

Table of Frequency Distribution based on AST levels

Criteria	Frequency	Percentage	Average AST Level (U/L)
Normal (4-40 U/L)	4	16 %	40 U/L
High > 4-40 U/L	21	84%	52 U/L
Amount	25	100%	

Source: Efarina Etaham Hospital Laboratory in Berastagi

From the table above, it was found that out of 25 respondents there were 4 respondents with normal AST levels of 40 U/L and 21 respondents with AST levels of 52 U/L. Where the normal level of AST is 4-40 U/L.

What affects the high levels of AST in cirrhosis of the liver is this is caused by disruption of cell membrane permeability, necrosis of hepatocyte cells and increased mitochondrial damage due to alcohol.

Characteristics Based on ALT Levels

Table 4.4 Frequency distribution based on ALT levels

Criteria	Frequency	Percentage	Average ALT levels (U/L)
Normal (4-46 U/L)	3	12 %	46 U/L
Height > 4-46 U/L	22	88 %	61 U/L
Amount	25	100 %	

Source: Efarina Etaham Hospital Laboratory in Berastagi

From the table above it was found that out of 25 respondents there were 3 respondents with normal ALT levels, namely 46 U/L and 22 respondents with ALT levels of 61 U/L. Where the normal ALT level was 4-46 U/L. What influences the high levels of ALT on cirrhosis of the liver is hemolysis in the sample, due to problems with the liver, bile, and heart organs.

Contents of Discussion Results

Based on the results of the research in table 4.3, the research showed that the results of examining AST and ALT levels in 25 people with cirrhosis of the liver at Efarina Etaham Berastagi Hospital, the results obtained were that some respondents had normal AST levels, most of the respondents who had high AST were 21 people .

Based on the results of the research in table 4.4, the research has shown that the results obtained by some respondents have normal ALT levels, most of the respondents who have high ALT are 22 people.

Based on table 4.1, the data obtained based on the gender of 20 people is 80%, 5 women (20%), research by Tambunan et al (2013) also obtained results that were not much

different, namely male sufferers (69, 6%) and as many as women (30.4%), and research by Marselina (2014) found as many male sufferers (67.7%) and as many as women (32.3%).

Based on the sex characteristics between men and women in patients with cirrhosis of the liver, the risk factors for cirrhosis of the liver include the large number of men who consume alcohol/heavy alcohol drinkers, whereas in women who are overweight or obese, it can cause fat in the liver tissue and cause cirrhosis of the liver.

Based on table 4.2, the data obtained by age showed that the age group of 51-60 years was 16 people (64%), the age group over 40 years was 7 people (28%). This is in accordance with a study conducted by Marselina (2014) who also found the most liver cirrhosis patients in the age group 51-60 years (34.3%),

A study by Patasik et al (2015) also found something that was not much different, namely that the most sufferers were in the 50-59 age group (31.4%).

Based on table 4.3, it was found that out of 25 respondents there were 4 respondents with normal AST levels, namely 40 U/L and 21 respondents with AST levels of 52 U/L. Where the normal level of AST is 4-40 U/L.

Based on Table 4.4, it was found that of the 25 respondents there were 3 respondents with normal ALT levels, namely 46 U/L and 22 respondents with ALT levels of 61 U/L. Where the normal ALT level was 4-46 U/L.

AST and ALT abnormalities can be caused by several diseases such as fulminant hepatitis, severe liver necrosis, MCI (myocardial infarction), myocarditis, cardiomyopathy, serious diseases including septicemia, malaria, cirrhosis of the liver, metastatic neoplasms to the liver, muscle disease, after muscle trauma, pancreatitis acute, drug-induced hepatitis, viral hepatitis, hepatic cell necrosis due to poisoning, cirrhosis, bile duct obstruction, liver congestion due to cardiac failure or skeletal muscle damage.

CLOSING

Conclusion

Based on the results of the study it can be concluded that:

1. The results of AST and ALT levels in patients with cirrhosis of the liver at Efarina Etaham Berastagi Hospital with 25 respondents showed that 7 patients had normal AST and ALT levels, 21 patients experienced increased AST levels, 22 patients experienced increased ALT levels.
2. AST and ALT abnormalities can be caused by several diseases such as fulminant hepatitis, severe liver necrosis, MCI (myocardial infarction), myocarditis, cardiomyopathy, serious diseases including septicemia, malaria, cirrhosis of the liver, metastatic neoplasms to the liver, muscle disease, after muscle trauma, pancreatitis acute, drug-induced hepatitis, viral hepatitis, hepatic cell necrosis due to poisoning, cirrhosis, bile duct obstruction, liver congestion due to cardiac failure or skeletal muscle damage.

Suggestions

It is better that during the research, it is better not only to do one measurement of AST and ALT, but to do several measurements to get accurate results.

REFERENCES

- Black, M.J. & Hawks, H .J., 2009. Medical surgical nursing: clinical management for Continuity of care, 8 th ed. Philadelphia : WB Saunders Company.
- Cahyono JBSB. 2009. Hepatitis A. Yogyakarta: Kanisius Yogyakarta
- Karina, 2007. Risk Factors for Death of Patients with Cirrhosis of the Liver in Dr. Hospital. Kariadi Semarang 2002-2006. <http://jurnal.fk.undip.ac.id> accessed on 16 September 2019
- Ministry of Health. 2014 Health information data center of the Republic of Indonesia. Hepatis situation and analysis. Jakarta
- Kosasih, EN and AS Kosasih. 2008. Interpretation of Clinical Laboratory Examination Results second edition. Karisma Publishing Group: Tangerang
- Nurdjanah, S. 2009. Cirrhosis of the Liver. In the Textbook of Internal Medicine, Edition 5. Jakarta: Internal Publishing
- Nurdjanah, S. 2014 Liver cirrhosis, In: Sudoyo AW, Setiyohadi B, Alvi Simadibrata MK, Setiati S, editor. Internal medicine textbook. 6th edition Jakarta: Department of Internal Medicine, Faculty of Medicine, Indonesia
- Riswanto. 2009 SGPT and SGOT (Serum Glutamic Pyruvic Transminase and Serum Glutamic Oxaloacetic Transminase), Indonesian Medicine. <http://labkesehatan.blogspot.com> accessed on 20 September 2019
- Setiati, 2007. Anatomy and physiology of the human body. Yogyakarta: Graha Science
- Sievert, William; Korman, MG ; Bolin, Terry, 2010. Everything About Hepatitis. Jakarta: Arcane.
- WHO, 2010. The global burden of diases 2010. www.who.int – accessed August 2016
- Rahmaniar, R., Subhan, S., Saharuddin, S., Nur Ilham, R. ., & Anwar, K. . (2022). THE INFLUENCE OF ENTREPRENEURSHIP ASPECTS ON THE SUCCESS OF THE CHIPS INDUSTRY IN MATANG GLUMPANG DUA AND PANTON PUMP. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(7), 337–348. <https://doi.org/10.54443/ijset.v1i7.36>
- likdanawati, likdanawati, Yanita, Y., Hamdiah, H., Nur Ilham, R., & Sinta, I. (2022). EFFECT OF ORGANIZATIONAL COMMITMENT, WORK MOTIVATION AND LEADERSHIP STYLE ON EMPLOYEE PERFORMANCE OF PT. ACEH DISTRIBUS INDO RAYA. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(8), 377–382. <https://doi.org/10.54443/ijset.v1i8.41>
- Nur Ilham, R., Arliansyah, A., Juanda, R. ., Sinta, I. ., Multazam, M. ., & Syahputri, L. . (2022). APPLICATION OF GOOD CORPORATE GOVERNANCE PRINCIPLES IN IMPROVING BENEFITS OF STATE-OWNED ENTERPRISES (An Emperical Evidence from Indonesian Stock Exchange at Moment of Covid-19). International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAAS), 2(5), 761–772. <https://doi.org/10.54443/ijeabas.v2i5.410>

- Rico Nur Ilham, Irada Sinta, & Mangasi Sinurat. (2022). THE EFFECT OF TECHNICAL ANALYSIS ON CRYPTOCURRENCY INVESTMENT RETURNS WITH THE 5 (FIVE) HIGHEST MARKET CAPITALIZATIONS IN INDONESIA. *Jurnal Ekonomi*, 11(02), 1022–1035. Retrieved from <http://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/481>
- Nur ilham, R., Likdanawati, L., Hamdiah, H., Adnan, A., & Sinta, I. . (2022). COMMUNITY SERVICE ACTIVITIES “SOCIALIZATION AVOID STUDY INVESTMENT” TO THE STUDENT BOND OF SERDANG BEDAGAI. *IRPITAGE JOURNAL*, 2(2), 61–64. <https://doi.org/10.54443/irpitage.v2i2.312>
- Wayan Mertha, I. ., & Mahfud, M. (2022). HISTORY LEARNING BASED ON WORDWALL APPLICATIONS TO IMPROVE STUDENT LEARNING RESULTS CLASS X IPS IN MA AS’ADIYAH KETAPANG. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, 2(5), 507–612. <https://doi.org/10.54443/ijerlas.v2i5.369>
- Mahfud, M., Yudiana, I. K., & Sariyanto, S. (2022). HISTORY OF BANYUWANGI KALIKLATAK PLANTATION AND ITS IMPACT ON SURROUNDING COMMUNITIES. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, 3(1), 91–104. <https://doi.org/10.54443/ijerlas.v3i1.492>
- Mahfud et all (2021). PEMANFAATAN TRADISI RESIK LAWON SUKU USING SEBAGAI SUMBER BELAJAR SEJARAH LOKAL PADA SMA DI BANYUWANGI. *Media Bina Ilmiah* Vol.16 No.3 Oktober 2021. <http://ejurnal.binawakya.or.id/index.php/MBI/article/view/1294/pdf>
- Sinta, I., Nur Ilham, R. ., Authar ND, M. ., M. Subhan, & Amru Usman. (2022). UTILIZATION OF DIGITAL MEDIA IN MARKETING GAYO ARABICA COFFEE. *IRPITAGE JOURNAL*, 2(3), 103–108. <https://doi.org/10.54443/irpitage.v2i3.467>
- Nur Ilham, R., Arliansyah, A., Juanda, R. ., Sinta, I. ., Multazam, M. ., & Syahputri, L. . (2022). APPLICATION OF GOOD CORPORATE GOVERNANCE PRINCIPLES IN IMPROVING BENEFITS OF STATE-OWNED ENTERPRISES (An Emperical Evidence from Indonesian Stock Exchange at Moment of Covid-19). *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBS)*, 2(5), 761–772. <https://doi.org/10.54443/ijebs.v2i5.410>
- Mahfud et all (2020). Developing a Problem-Based Learning Model through E-Learning for Historical Subjects to Enhance Students Learning Outcomes at SMA Negeri 1 Rogojampi. *IOP Conf. Series: Earth and Environmental Science* 485 (2020) 012014 <https://doi:10.1088/1755-1315/485/1/012014>

**DESCRIPTION OF THE LEVELS OF ASPARTATE AMINOTRANSFERASE (AST) AND ALANINE AMINOTRANSFERASE (ALT) ENZYME IN PATIENTS WITH CIRROSIS OF THE LIVER AT EPHARINA HOSPITAL
ETAHAM BERASTAGI**



Sri Wahyuni Tarigan¹, Ian Wooton², Maswan³, Josep Lubis⁴, Efrin Syafrina⁵
