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RELATIONSHIP CHARACTERISTICS OF COVID-19 PATIENTS WITH SGOT AND SGPT LEVELS

Salbiah[1]*,Liza[2], Indarsita Dina[3], ,Ariska Sri[4]

[1]Health Polytechnic of Jakarta 3
[2]Adhyaksa Hospital, Jakarta
[3]Health Polytechnic of Medan
[4]Health Polytechnic of Jakarta 3
*Coresponding author: salbiahkhamaruddin231@gmail.com

ABSTRACT

Laboratory tests on COVID-19 patients include hematology, clinical chemistry, and molecular examinations. According to several studies, patients infected with COVID-19 have impaired liver function which is characterized by an increase in SGOT and SGPT. An increase in liver enzymes is also a sign of liver injury.The purpose of this study was to determine the relationship between the characteristics of COVID-19 patients with SGOT and SGPT levels. The research method is analytic observational with cross sectional design. . This research was conducted at Adhyaksa General Hospital in Jakarta. The sample of this study is medical record data of COVID-19 patients with positive PCR results who carried out SGOT and SGPT examinations for the period January - April 2021 on 90 patiens.The results showed that as many as 76.7% of patients experienced an increase in SGOT levels and 77.8% of patients on SGPT, with age 50 years as many as 57.8% and male sex as much as 66.7%, the general condition of patients in medium level as much as 72.2%.The results of statistical tests using the chi square test showed that there was no significant relationship between the characteristics of COVID-19 patients and levels of SGOT and SGPT. This is because there are other mechanisms that affect the enzymatic state of the liver, especially SGOT and SGPT.

1. INTRODUCTION

Indonesia is one of the countries infected with the COVID-19 pandemic since the first case was reported on March 2, 2020. As of August 9, 2021, according to the map of the distribution of COVID-19 2021 from 34 provinces, there were 3,666,031 confirmed cases of COVID-19 of which 107,096 cases died, 51.5% of cases occurred in males, most of which occurred in the age range. 45-54 years and the least occurs at the age of 0-5 years.

The highest mortality rate was found in patients aged 55-64 years (Decree of the Minister of Health of the Republic of Indonesia Number HK. 01. 07 / MENKES / 413/2020 concerning Guidelines for the Prevention and Control of Coronavirus Disease 2019)

World Health Organization divides the COVID-19 disease into suspected, probable and confirmed cases, while the Ministry of Health of the Republic of Indonesia (Kemenkes RI) classifies it into people under monitoring (ODP), patients under surveillance (PDP), asymptomatic people (OTG) and confirmed patient if positive COVID-19 RT-PCR results with any symptoms (Handayani et al., 2020). Clinical symptoms of infection with this virus vary from fever, cough, weakness, myalgia, and diarrhea. The degree of severity also varies from asymptomatic, mild symptoms, to severe symptoms (Andreas et al., 2020). The incubation period is 1-14 days, causing signs and symptoms of respiratory syndrome, fever, leukopenia, thrombocytopenia and in severe conditions of multi-organ failure which ends in death (Sukmana & Yuniarti, 2020).

Laboratory examinations play an important role in handling Covid-19, starting

from screening, diagnosis, monitoring therapy, determining prognosis, to surveillance (Yusra & Pangestu, 2020). According to Partakusuma et al., (2020), the Covid-19 laboratory examination includes hematological examination (hemoglobin, hematocrit, erythrocytes, leukocytes, platelets), clinical chemistry (Serum Glutamic Oxaloacetic Transaminase/SGOT, Serum Glutamic Pyruvate Transaminase/SGPT, urea, creatinine). , blood gas analysis, seroimmunology (CRP, ferritin, covid-19 antibody, covid-19 antigen), molecular (PCR and Molecular Rapid Test).

The results of laboratory tests for COVID-19 patients depend on the severity of the disease and patient characteristics. According to various cases compiled by doctors in Wuhan, China, the results of laboratory tests in some patients showed an increase in liver enzymes (SGOT, SGPT), lactate dehydrogenase (LDH), muscle enzymes, and myoglobin (Pariang et al., 2020). And if the SGOT and SGPT increase, it is most likely to have impaired liver function in other words, you will be easily infected, in this case COVID-

19.

Researchers from China who also conducted a study on cases with gastrointestinal complaints found that from 95 cases studied, 58 cases (61.6%) had gastrointestinal symptoms. Gastrointestinal symptoms that appear include diarrhea as much as 24.2%, nausea 17.9%, vomiting 4.2% and impaired liver function which is characterized by an increase in SGOT/SGPT as much as 32.6%. (Burhan et al., 2020). Patients with elevated transaminase enzymes indicating liver injury. In SARS-CoV-2 infection, elevated transaminases are associated with disease severity. However, the mechanism of liver injury in SARS-CoV-2 infection has not been determined. (Khairina Putri Faisal et al.,2020).

This study aims to find out the relationship of Covid-19 patients characteristics with SGOT and SGPT levels at Adhyaksa General Hospital.

2. METHODE

The design of this study used an observational analytic method with a cross sectional design. The research sample was 90 patients who were positive for COVID 19 for the period January − April 2021 (where these patients had carried out PCR tests and SGOT - SGPT tests at the Adhyaksa General Hospital Jakarta laboratory).

3. RESULTS

The results of the study of SGOT and SGPT levels in confirmed COVID-19 patients can be described as follows:

Table 1. Frequency Distribution of Characteristics (Age, Gender, General Condition) of COVID-19 Patients at Adhyaksa General Hospital Jakarta, period January – April 2021

Characteristics		
Age	**Frekuensi (n)**	**Persentase (%)**
<50 years	25	27,8
≥ 50 years	65	72,2
Sum	90	100,0%
Sex		
Male	60	66,7
Female	30	33,3

Sum	90	100%
General condition		
Moderate	65	72,2
Weak	25	27,8
Sum	90	100,0%

Table 1 shows that from 90 patients who were confirmed positive for COVID-19, as many as 65 patients (72.2%) were >50 years old, the most gender is male, namely 60 patients (66.67%), and with the general condition of the patients mostly in moderate condition that is 65 patients (72.2%).

Table 2. Frequency distribution of SGOT and SGPT levels in COVID-19 patients at Adhyaksa General Hospital Jakarta, Period January – April 2021

Category	n	%
SGOT		
Normal	21	23,3
Increase	69	76,7
Sum	90	100,0%
SGPT		
Normal	20	22,2
Increase	70	77,8
Sum	90	100,0%

Table 2 shows that of the 90 COVID-19 patients who underwent the examination, there were 69 patients (76.7%) who had increased SGOT levels and 70 patients (77.8) had their SGPT levels increased.

Table 3. Table of Cross Tests Between Age and SGOT Levels of COVID 19 Patients at Adhyakasa General Hospital Jakarta, Period January – April 2021

Age	SGOT Levels				Sum		*P value*
	Normal		Increase				
	n	%	n	%	n	%	
<50 years	8	8,9	17	18,9	25	27,8	0,354
≥50 years	13	14,4	52	57,8	65	72,2	
Sum	21	23.3	69	76,7	90	100	

Table 3 shows that as many as 65 patients (72.2%) aged 50 years, 52 patients (57.8%) had elevated SGOT levels. The result of the chi square test was 0.354, which means that there was no significant relationship between age and SGOT levels in confirmed COVID-19 patients.

Table 4 Table of Cross Tests Between Age and SGPT Levels of COVID-19 Patients at Adhyaksa General Hospital Jakarta, Period January – April 2021

Age	SGPT Levels				Sum		P value
	Normal		Increase				
	n	%	n	%	n	%	
<50 years	7	7,8	18	20	25	27,8	0.593
≥51 years	13	14,4	52	57,8	65	72,2	
Sum	20	22,2	70	76,8	90	100	

Table 4 shows that 65 patients aged 50 years, 52 patients (57.8%) experienced an increase in SGPT levels. The result of the chi square test is 0.593, it's means that there is no significant relationship between age and SGPT levels in confirmed COVID-19 patients

Table 5. Cross Table Between Gender and SGOT . Levels COVID 19 patients at Adhyaksa General Hospital Jakarta, Period January – April 2021

Gender	SGOT Levels				Sum		P value
	Normal		Increase				
	n	%	n	%	n	%	
Male	16	17,8	44	48,9	60	66,7	0.428
Female	5	5,5	25	27,8	30	33,3	
Sum	21	23,3	69	76,7	90	100	

Table 5 shows that most of the patients were male, as many as 60 patients (66.7%), 44 patients (48.9%) of whom had increased levels of SGOT. The results of the chi square test were obtained at 0.428, it's means that there is no significant relationship between gender and SGOT levels in confirmed COVID-19 patients.

Table 6. Cross Table between Gender and SGPT Levels of COVID 19 Patients at Adhyakasa General Hospital Jakarta, Period January – April 2021

Gender	SGOT Levels				Sum		P value
	Normal		Increase				
	n	%	n	%	n	%	
Male	11	12,2	49	54,5	60	66,7	0.324
Female	9	10	21	23,3	30	33,3	
Sum	20	22,2	70	77,8	90	100	

Table 6 shows that 49 male patients (66.7%) had an increase in SGPT levels and 21 female patients (23.3%) also experienced an increase in SGPT levels. The results of the chi square test are 0.324, which means that there is no significant relationship between gender and SGPT levels in confirmed COVID-19 patients.

Table 7. Cross Table Between General Condition and Patient's SGOT Level COVID 19 at Adhyaksa General Hospital Jakarta, Period January – April 2021

General condition	SGOT Levels				Sum		P value
	Normal		Increase				
	n	%	n	%	n	%	
Moderate	17	18,9	48	53,4	65	72,3	0.458
Weak	4	4,4	21	23,3	25	27,7	
Sum	21	23,3	69	76,7	90	100	

Table 7 shows that as many as 65 patients (72.3%) were in moderate general condition and
48 patients (53.4%) of them experienced an increase in SGOT levels. While patients in general weak condition found an increase in SGPT levels as many as 21 patients (23.3%). The results of the chi square test were obtained at 0.458, it's means that there is no significant relationship between General Condition and SGOT levels in confirmed COVID-19 patients.

Table 8. Cross Table Between General Condition and SGPT Levels of COVID 19 Patients at Adhyaksa General Hospital Jakarta, Period January – April 2021

General condition	SGPT Levels				Sum		P value
	Normal		Increase				
	n	%	n	%	n	%	
Moderate	16	17,8	49	54,5	65	72,3	0.550
Weak	4	4,4	21	23,3	25	27,7	
Sum	20	22,2	70	77,8	90	100	

Table 8 shows that the increase in SGPT levels occurred in patients in the moderate general condition group, namely 49 patients (54.5%) and 21 patients (23.3%) from the weak patient group. The result of the chi square test is 0.550, which means that there is no significant relationship between general condition and SGPT levels in confirmed COVID-19 patients

4. DISCUSSION

There are more COVID 19 patients aged 50 years (72.2%) than respondents aged <50 years (27.8%). This is similar to a study conducted by Wang et al in 2020 which showed that patients in the group who underwent liver function tests had an average age of 51 years (Wang et al., 2020). In fact, SARS-CoV-2 is susceptible to all populations, but the elderly and patients with chronic disease are more likely to suffer from severe conditions after infection because the elderly are not as resistant as young people due to the degradation of various physiological functions (Kang & Xu, 2020). The results of this statement are supported by a study conducted by Fadl et al (2021) which stated that COVID-19 infection is associated with comorbidities and age, which is usually associated with increased levels of angiotensin II leading to an increased risk of severity when exacerbated by SARS-CoV-2 infection. due to the impact of angiotensin II on pro- inflammatory cytokines, vasoconstriction and pulmonary disorders (Fadl et al., 2021).In this study, there were more male COVID-19 patients than women. This is not much different from the study conducted by Kumar et al., 2020 that SARS-CoV-2 infection was more common in men (67%) than women (23%). These differences are likely due to gender-specific behaviour, genetic and hormonal factors, and sex differences in biological pathways associated with SARS-CoV-2 infection.

The reduced susceptibility of women to viral infections can be attributed to protection from the X chromosome and sex hormones, which play an important role in innate and adaptive immunity (N. C. Chen et al., 2020). Males consistently represent more severe infections in acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and are included in higher mortality rates. Given that smoking and COPD (Chronic Obstructive Pulmonary Disease) are more common among men, the higher ACE2 expression due to these risk factors may partly explain the poorer COVID-19 outcomes in men. In general, ACE2 expression is increased in men and decreased in women. These effects can be modified/potentiated by gender-specific factors/behaviors, and should be investigated in future studies dedicated to gender differences (Haitao et al., 2020).

Patients with moderate general condition (72.2%) were compared with weak general condition (27.8%). The general condition is seen from the clinical condition of the patient at the time of consultation with the doctor at the beginning of the examination. The general condition is moderate or good, namely the patient with or without symptoms, but still in good condition, can walk but looks sick. Weak general condition is defined as the clinical condition of the patient who is weak and unable to walk. This is similar to the study conducted by Tian et al., 2020 regarding the symptoms and conditions of patients infected with COVID-19. Of the 262 patients, 216 (82.4%) were categorized into the general group and 46 (17.6%) were categorized into the weak group. The general group included 192 (73.3%) mild cases, 11 (4.2%) non-pneumonic cases and 13 (5.0%) asymptomatic cases. In the weak condition patients needs oxygen assistance, the mean oxygen saturation (SPO 2) of the severe patients is 68%-100% (Tian et al., 2020).

An increase in SGOT levels occurred in 76.7% of COVID-19 patients and an increase in SGPT by 77.8%. The results of this enzymatic increase are similar to the study conducted by Hwaiz et al., 2020 which showed that >60% of COVID-19 patients had abnormal liver enzyme activity. The most common enzymatic elevations were total bilirubin, ALT, AST and the next less common was ALP elevation, with 52.7%, 34.7%,40.0% and 20.3%, respectively. This is because ACE 2 is located in liver cells and is the target of SARS-CoV-2, which is the reason for the easy entry of SARS-CoV-2 into liver cells (Hwaiz et al., 2020).

An over 51 years old with increased SGOT levels by 57.8% and SGPT levels by 57.8%. According to Chen et al., 2020 the median age of fatal cases of COVID-19 infection was 69 years (range, 51–86 years). Older patients have higher comorbidities, more severe symptoms, and are more prone to multiple organ involvement and death than younger patients. The increase in liver enzymatic activity in the elderly is due to comorbidities experienced by the patient. From a study conducted in the elderly by

Chen et al., 2020, 70% of cases were reported with comorbidities, including 56.0% with hypertension, 26.0% with diabetes, 16.0% with coronary heart disease (CHD), 12.0% with cerebrovascular disease (CVD), 12.0% with COPD, and 10.0% with kidney disease.. Although it has been observed that the most severe and fatal cases of COVID-19 occur in elderly people with liver injury, the relevant pathophysiology remains unclear. Factorsthat lead to poor health outcomes include physiological changes in aging and various age- related complications (Wu & Yang, 2020).

The group of patients who experienced an increase in aminotransferases (SGOT and SGOT) were patients with male. Differences in aminotransferase enzymatic test results refer to biological characteristics, including hormonal, immune and inflammatory responses to infection, which have the potential to influence the severity and outcome of COVID-19 infection. Partly due to differences in the ratio of fat to muscle, lipid metabolism, and hormonal effects on liver cells. Pre-menopausal women have a lower risk of liver inflammation, nonalcoholic steatohepatitis, and increased cardiovascular risk (Haitao et al., 2020). The hormone estrogen enhances both innate and adaptive immune responses, potentially leading to faster pathogen clearance, milder symptoms in women, and a stronger immune response to vaccines. In addition, estrogen is associated with decreased expression of the angiotensin-converting receptor 2 (ACE2) receptor, which is a functional receptor for SARS-CoV-2 to enter target host cells. On the other hand, testosterone is associated with a suppressive effect on immune function, which may explain the greater susceptibility to infectious diseases observed in males. (Ya'qoub et al.,2020).

Patients in moderate general condition with elevated SGOT and SGPT levels have various clinical manifestations, including fever, cough, dyspnea, symptoms of changes in smell and taste, gastrointestinal symptoms, and headaches (Wu & Yang, 2020). Most of the COVID-19 patients who came initially only with digestive complaints. The most common digestive symptoms are anorexia, nausea, vomiting, and diarrhea. . The onset of digestive symptoms associated with abnormal liver enzymes in infected patients. This may be related to the uptake of the ACE-2 receptor by viruses located on certain intestinal cells, cholangiocytes, and hepatocytes. There is currently no strong evidence to suggest that the severity of digestive symptoms corresponds to the severity of the clinical course of COVID-19, but more severe changes in liver enzymes may correlate with a worse clinical course. ACE2 is quite influential in inflammation, which can lead to diarrhea (Agarwal et al., 2020).

The results of this study using the Chi Square test showed that there was no relationship between the characteristics of COVID-19 patients with SGOT and SGPT levels, which means that age, gender, and general condition of COVID-19 patients did not significantly affect the increase in SGOT and SGPT levels. This may be due to other mechanisms involved and the presence of various factors that affect the enzymatic state of the liver, especially SGOT and SGPT. Liver function test during COVID-19 is common, although clinically significant liver injury is rare. Further studies are needed focusing on the effects of existing liver-related comorbidities on COVID-19 treatment and outcomes. According to Garrido et al., 2020, it is still unclear whether liver injury is caused by the virus itself or reflects a severe inflammatory response with liver damage. In addition, both lymphopenia and elevated liver enzymes were associated with the severity of COVID-19 (Wang et al., 2020).

5. CONCLUSION

a. As many as 76.7% of patients with COVID-19 experienced increased levels of SGOT and 77.8% of patients who experienced increased levels of SGPT.
b. Increased levels of SGOT and SGPT occur in COVID 19 patients aged 50 years
c. Male COVID-19 patients who experienced increased levels of

SGOT and SGPT more than female patients

d. The increase in SGOT and SGPT levels in COVID-19 patients mostly occurred in moderate patient conditions.

e. There is no significant relationship between the characteristics of COVID-19 patients (age, gender, general condition) with levels of SGOT and SGPT

6. SUGGESTIONS

a. It is recommended for research to correlate liver enzymatic parameters with the severity of COVID-19

b. The next researcher can analyze differences in SGOT and SGPT levels in comorbid and non-comorbid COVID-19 patients.

SPECIAL THANKS TO:

a. Adhyaksa General Hospital in Jakarta; https://*rsuadhyaksa*.co.id

b. Polytechnic Health of Jakarta 3 : www.poltekkesjakarta3.ac.id

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