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Description of SGOT and SGPT Levels among Porters in shipping Companies

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ABSTRACT

Background: Most Indonesians rely on physical labor, such as farming, manual labor, and portering, for their livelihoods. These occupations tend to be high-intensity and are often accompanied by an unbalanced diet and a work environment that is less conducive to health. Such conditions can affect liver function, as indicated by elevated SGOT and SGPT levels.

Object: This quantitative descriptive study aimed to describe SGOT and SGPT levels among porters in the Sidotopo area, Surabaya. **Method:** A total of 31 respondents were selected using purposive sampling based on specific criteria, including a minimum of 5 years of service, lifting loads of ≥ 55 kg, and working at least 8 hours per day. Data were collected through questionnaires and laboratory examinations of SGOT and SGPT conducted at the Clinical Pathology Laboratory, University of Muhammadiyah Surabaya. **Result:** The results showed that 29 respondents (93.55%) had SGOT levels within the normal range (0–50 U/L), while 2 respondents (6.45%) had SGOT levels exceeding the normal value (>50 U/L), with the highest level reaching 65.7 U/L. Similarly 27 respondents (87%) had SGPT levels within the normal range (0–50 U/L), whereas 4 respondents (13%) had SGPT levels above the normal range (>50 U/L). All respondents with elevated SGPT levels were aged 48 years and older. **Conclusion:** These findings indicate that although most porters maintained normal liver enzyme levels, a small proportion showed elevated SGOT and SGPT levels, particularly among older workers. This may reflect an age-related decline in liver function, potentially compounded by prolonged heavy workloads.

Keywords: SGOT, SGPT, Porters, Liver Function, Physical Workload, Age

BACKGROUND

Most Indonesians work in physically demanding sectors such as agriculture, fisheries, manufacturing, construction, transportation, and warehousing. According to data from the Badan Pusat Statistik (BPS) of East Java as of August 2023, the agricultural sector employs the largest proportion of workers (32.66%), followed by manufacturing (18.23%), construction (6.50%), and

transportation and warehousing (5%). The demands of these occupations include long and exhausting working hours, which are often not balanced by adequate nutrition and sufficient rest. (Badan Pusat Statistik Jawa Timur, 2023).

Porters work in a non-ideal environment, with heavy physical activity and exposure to air pollution, dust, vehicle exhaust, and chemicals from the goods

they transport. High work pressure, long working hours, and limited rest time often cause fatigue and unhealthy habits, such as consuming energy drinks or alcohol to increase stamina, which can interfere with liver function. Liver damage causes SGOT and SGPT enzymes to leak into the bloodstream, indicating liver metabolism impairment and transaminase activity, which plays an important role in amino acid processing and detoxification. (Nurrofikoh, 2024).

Based on preliminary observations, loading and unloading activities at shipping warehouses still heavily rely on manual labor, particularly porters. This work involves intense physical activity with minimal mechanical support, which may lead to fatigue and health problems due to the heavy workload. This study notes that most manual laborers, have unhealthy lifestyle habits that can potentially damage liver function. Patterns often observed in this group of workers include excessive smoking and diets that are high in fat and calories but low in nutritional value. Many workers routinely consume large amounts of instant foods or fried foods, unaware of the impact on vital organs, especially the liver. In addition, regular consumption of energy drinks to boost stamina is a common practice among these workers. The high caffeine, sugar, and various additive content can increase the metabolic load on the liver.

Environmental factors, such as exposure to dust and chemicals in the workplace, as well as lack of adequate rest, worsen this problem. The cumulative impact of these unhealthy habits, chronic exposure, and lack of recovery forces the liver to bear an additional detoxification burden. If these lifestyle habits are prolonged over the long term, the risk of liver dysfunction among manual workers will increase significantly, requiring further health interventions. The work system applied is generally Piece-Rate, based on an agreement between workers and service users. The lack of equipment

in this process means that all physical workloads are directly carried by porters, which ultimately increases the risk of work fatigue. Their main job is to transport goods, and on a daily basis, they are able to lift loads ranging from 80 to 100 kg in one lift. This workload significantly exceeds the safe threshold. The 55 kg limit has been set in the Keselamatan dan Kesehatan Kerja (K3) guidelines as a critical threshold that requires the use of tools or the deployment of a team. Regular exposure to workloads that exceed this critical threshold causes high physiological risks.

SGOT (Serum Glutamic Oxaloacetic Transaminase), also known as AST (Aspartate Aminotransferase), is an enzyme found primarily in the heart muscle and liver, with moderate concentrations in skeletal muscle, kidneys, and pancreas. Elevated SGOT levels in the blood reflect hepatocyte damage caused by increased cell membrane permeability. When liver cells are damaged, this enzyme is released into the bloodstream and can be measured as an indicator of liver dysfunction (Ramadhan & Lestari, 2023). SGPT (Serum Glutamic Pyruvic Transaminase), also known as ALT (Alanine Aminotransferase), is used as an indicator of liver dysfunction based on its concentration in the blood. This enzyme is primarily found in liver cells, and when liver tissue is damaged, it is released into the bloodstream, leading to elevated SGPT levels that indicate hepatic injury or dysfunction (Widarti & Nurqaidah, 2019).

Liver function tests generally cannot provide information about the exact cause of liver disease. These tests are more indicative of whether the liver is functioning normally or has a disorder, and assess the extent and severity of damage or injury to the liver (Kahar, 2018). The liver, as an organ that has an important role in many biological processes, such as neutralizing toxins that enter the body, processing nutrients into energy, and various vital functions, is very susceptible

to damage. Therefore, maintaining liver health is very important, and this organ should always receive adequate attention and care to ensure that it continues to function optimally.

Based on the explanation above, and supported by the lack of data and research on liver function in groups of heavy physical workers, researcher is interested in conducting further research. This study will describe the levels of SGOT & SGPT in workers with heavy physical jobs like porters at the Shipping Warehouses.

RESEARCH METHODS

Materials and Method

This quantitative descriptive study was conducted to determine the SGOT and SGPT levels in porters at shipping warehouses in the Sidotopo area in the period February 2025 – June 2025. All samples in this study were male. The

sampling technique used was purposive sampling, which is a technique for determining samples based on specific criteria. The sample consisted of 31 respondents who met the following criteria:

1. Inclusion Criteria
 - a. Male porters working in the Sidotopo Area
 - b. Willing to participate in the study by signing the informed consent form
 - c. Have worked for at least 5 years
 - d. Have working hours of 8 hours per day
 - e. Lift loads of at least 55kg
2. Exclusion Criteria
 - a. Porters with known liver disease
 - b. Porters who are uncooperative or refuse examination

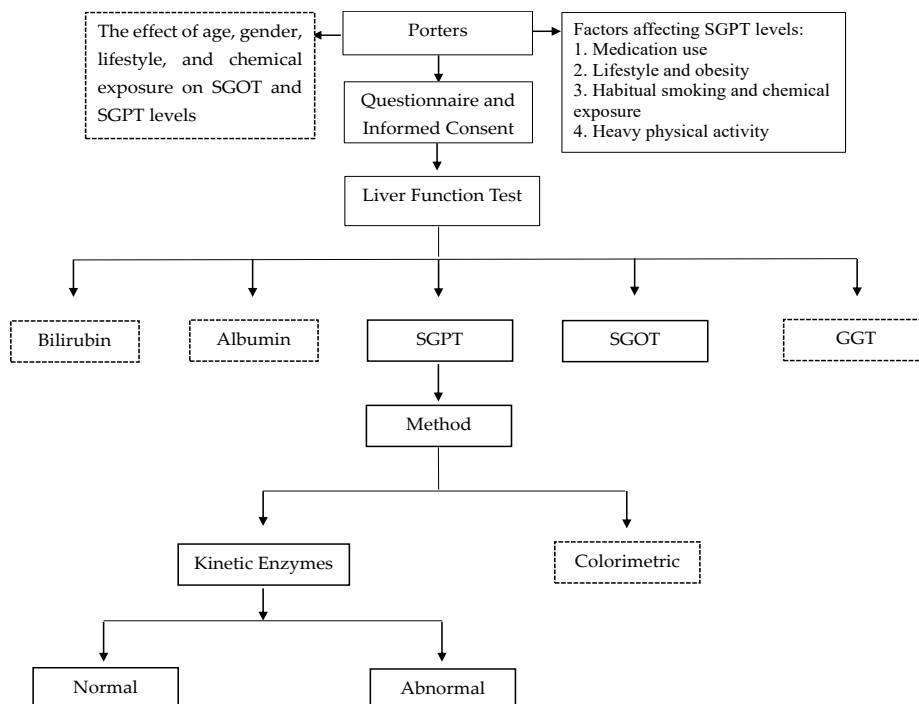


Figure 1. Research Design

The research was conducted by obtaining permission and ethical approval. Data were collected using questionnaires to

characterize the data, followed by sampling. The samples were then analyzed for SGOT and SGPT levels using a

Humalyzer 2000 Spectrophotometer at the Clinical Pathology Laboratory of Muhammadiyah University Surabaya. SGOT and SGPT levels were classified as Normal (≤ 50 U/L) and High (> 50 U/L) (MedSource Reagent, 2025). Data analysis was performed using simple statistics to calculate frequency distribution and percentages.

Data presented in this section were derived from SGOT and SGPT tests conducted on all 31 respondents at the Clinical Pathology Laboratory of Muhammadiyah University Surabaya. The results were classified into two categories, namely normal and high, based on the reference value of 0-50 U/L from MedSource Reagent. Details of the SGOT test results are as follows:

RESULT AND DISCUSSION

Table 1.

SGOT Levels in Porters

SGOT	Levels (U/L)	Amount	Percentage
Normal	0 – 50	29	93.55%
Abnormal	>50	2	6.45%
Total		31	100%

Based on Table 1, 29 respondents (93.55%) of the porters at the shipping company had normal SGOT levels (0–50 U/L), while 2 respondents (6.45%) had

high SGOT levels (>50 U/L). From the results of data analysis, it shows that the samples predominantly have normal SGOT levels of 93.55%.

Table 2.

SGPT Levels in Porters

SGPT	Levels (U/L)	Amount	Percentage
Normal	0 – 50	27	87%
Abnormal	>50	4	13%
Total		31	100%

Based on Table 2, 27 respondents (87%) of the porters at the shipping company had normal SGPT levels (0–50 U/L), while 4 respondents (13%) had high SGPT levels (>50 U/L). From the results of data analysis, it shows that the samples

predominantly have normal SGPT levels of 87%. From these results of transaminase enzyme level analysis (SGOT and SGPT), there were variations in normal and abnormal status across different age groups.

Table 3.

SGOT Levels Based on Age Interval

Age (Years old)	Normal		Abnormal	
	Amount	Percentage	Amount	Percentage
23 – 27	10	37.04%	0	0%
28 – 32	8	29.63%	0	0%

Age (Years old)	Normal		Abnormal	
	Amount	Percentage	Amount	Percentage
33 – 37	4	11.11%	1	50%
38 – 42	2	7.41%	0	0%
43 – 47	1	3.70%	0	0%
48 – 52	4	11.11%	1	50%

In **Table 3**, SGOT levels were within the normal limits in the majority of the samples. The younger age group have a large number of normal SGOT levels, with the highest contributions from 23 – 27

years (37.04%) and 28 – 32 years (29.63%) groups. Abnormal SGOT levels were exclusively found in the older age groups, namely 33 – 37 years and 48 – 52 years.

Table 4.

SGPT Levels Based on Age Interval

Age (Years old)	Normal		Abnormal	
	Amount	Percentage	Amount	Percentage
23 – 27	12	38.7%	0	0%
28 – 32	7	22.6%	0	0%
33 – 37	5	16.1%	0	0%
38 – 42	2	6.5%	0	0%
43 – 47	1	3.2%	0	0%
48 – 52	0	0%	4	100%

In **Table 4**, abnormal SGPT levels showed the sharpest polarization. Abnormal SGPT levels were found exclusively in the 48 – 52 age group. This confirms that abnormal SGPT is the only concern in the oldest age group studied. Conversely, normal SGPT levels dominated the younger age groups, particularly 23 – 27 years (38.7%) and 28 – 32 years (22.6%). Overall, the data clearly show that the younger age group has very normal transaminase levels, while the risk of elevated SGOT and SGPT levels is significantly concentrated in the older age group.

Discussion

Based on the examination of a total of 31 blood samples from porters, obtained SGOT and SGPT liver enzyme levels

varied. For the SGOT, 29 samples (93.55%) had levels within the normal range (0–50 U/L), with the lowest value of 11.7 U/L and the group average reaching 31.4 U/L. However, there were 2 samples (6.45%) that showed SGOT levels exceeding the normal limit (>50 U/L), with the highest measured value being 65.7 U/L. Meanwhile, the SGPT test results showed a more dominant increase, where 4 samples (13%) had high SGPT levels (>50 U/L). Most, namely 27 samples (87%), remained within normal limits (0–50 U/L). Overall, these findings indicate the possibility of liver dysfunction or muscle damage in a small portion of the porter population, which may be associated with heavy and repetitive

physical activity and potential metabolic stress in their work environment.

Enzyme levels were mostly normal (93.55% SGOT and 87% SGPT), supported by the fact that most respondents had relatively short working periods (<5 years), daily working hours did not exceed 8 hours, and they rarely worked overtime. This controlled work pattern allows adequate recovery time for the body, and is supported by the fact that none of the porters had a history of liver disease.

Elevated SGOT levels can be an indicator of hepatocyte cell damage, which is usually caused by increased cell membrane permeability due to metabolic stress or physical injury. In the context of manual labor, heavy and repetitive physical activities such as lifting weights of 50–80 kg per day can cause microdamage to muscles and liver cells. This is reinforced by findings from a study Sari & Inayah, (2024) which states that excessive physical activity can trigger work fatigue, which in turn can increase SGOT levels due to the release of enzymes from damaged cells into the bloodstream.

Individuals in the younger age group generally still have high metabolic capacity, optimal blood circulation, and good muscle and liver endurance. According to Mubarak, (2023), the liver in young individuals tends to be more efficient in carrying out detoxification processes, protein metabolism, and natural cell repair. This explains why most young porters still show normal SGOT levels, even when exposed to strenuous physical activity.

Elevated SGPT levels in healthy individuals can be classified as a non-pathological response to strenuous physical activity. Intense physical work such as continuous weight lifting triggers muscle stress, which contributes to the release of SGPT enzymes into the bloodstream. This increase is temporary and is often aggravated by sampling times that are too close to intensive work

sessions, or by metabolic stress conditions resulting from low calorie intake and dehydration. Therefore, strenuous physical activity is an important non-hepatic factor that must be considered in the interpretation of SGPT results (Hasselbeck et al., 2024).

According to research by H. et al., (2022), unhealthy diets, especially high in sugar, saturated fat, and processed foods, are major risk factors for non-alcoholic fatty liver disease (NAFLD), which plays a significant role in increasing SGPT. Based on the journal by Salehi-Sahlabadi et al., (2021), high SGPT levels are closely related to an individual's diet. A Western dietary pattern was found to significantly increase the risk of NAFLD, which in turn causes an increase in SGPT levels as a marker of liver cell damage Wang et al., (2019). This pattern is characterized by high consumption of fast food, processed meat and organ meats, high-fat dairy products, sweetened beverages such as soft drinks, sweet desserts, and foods containing saturated and trans fats. Conversely, a healthy dietary pattern that includes high consumption of fresh fruits and vegetables, nuts, fish, low-fat dairy products, olive oil, and garlic has a protective effect on liver function, reducing oxidative stress, insulin resistance, and SGPT levels. High intake of fructose and sugar from processed foods also triggers fat synthesis in the liver, leading to increased SGPT levels.

Based on the journal “Hallmarks of Aging in the Liver” J. et al., (2019), it is explained that as we age, liver function experiences a decline in adaptive capacity and an increase in metabolic stress accumulation due to various complex biological changes. Aging causes dysfunction in all types of liver cells, such as hepatocytes, liver sinusoidal endothelial cells (LSECs), Kupffer cells, and stellate cells, each of which undergoes phenotypic and molecular changes.

An unbalanced lifestyle, characterized by excessive work patterns

and chronic fatigue, especially due to continuous overtime, has a significant impact on liver and muscle health (Salehi-Sahlabadi et al., 2021). Long-term fatigue disrupts circadian rhythms and cell recovery time, triggering the accumulation of physiological stress and an increase in stress hormones such as cortisol. This condition disrupts normal metabolism, which in turn can cause mild inflammation and oxidative stress in hepatocytes and muscle cells. As a result, when liver and muscle cells are damaged, SGPT and SGOT enzymes leak into the bloodstream. Elevated levels of both enzymes serve as early indicators of liver dysfunction and muscle damage due to chronic work stress and unhealthy lifestyles. Therefore, respondents with persistent fatigue and unbalanced work patterns are at high risk of liver dysfunction.

Although most workers showed normal SGOT and SGPT levels, this does not mean that they are safe from long-term risks. Workers with normal SGOT and SGPT levels may currently have better immunity, be younger, or have healthier lifestyles, but these conditions may change over time if their workload remains high and is not accompanied by adequate physical recovery. This study shows that intensive manual labor without appropriate recovery can be a major risk factor for liver damage.

CONCLUSION

An analysis of the results reveals that the majority of porters, 93.55% for SGOT and 87% for SGPT maintain normal levels. This outcome is supported by key protective factors such as the respondents' younger age, a relatively short duration of employment (less than 5 years), controlled daily working hours (not exceeding 8 hours), minimal overtime work, and the no liver disease history. These conditions collectively ensure sufficient recovery time, minimizing chronic stress accumulation.

However, despite the overall normal results, the detection of elevated levels in a small subset of the population, 13% for SGPT and 6.45% for SGOT highlights a risk. This elevation is primarily considered a non-pathological response to the strenuous, repetitive physical activity which is lifting 50–80 kg/day, which induces microdamage to muscle and liver cells. This stress is often compounded by chronic work-related fatigue, unbalanced lifestyles, and poor dietary patterns, which contribute to metabolic stress and subsequent enzyme leakage into the bloodstream.

In conclusion, while the current profile of the porters suggests resilience, the study indicates that intensive manual labor without appropriate recovery poses a significant risk factor for subclinical liver dysfunction and muscle damage. Workers with seemingly normal levels must be monitored, as these conditions are subject to change over time, especially with continuous high workload and the natural decline in hepatic adaptive capacity.

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