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THE EFFECT OF *STARTING* READING ON RESULTS *SERUM GLUTAMIC PYRUVIC TRANSMINASE* (SGPT) ON ENZYME TESTING

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ABSTRACT

Background: Serum Glutamic Pyruvic Transaminase (SGPT), also known as alanine aminotransferase (ALT), is a clinical chemistry parameter that can be used to evaluate hepatocellular conditions based on enzyme activity. The kinetic method is performed by observing changes in absorbance during the enzymatic reaction. One analytical aspect related to the measurement of enzyme activity is the initial reading time (*starting reading*), as differences in measurement time may be associated with variations in the test results. **Objective:** This study aimed to determine whether variations in starting reading time affect SGPT test results. **Research Methods:** This study employed an *experimental static group comparison* design. The samples consisted of 6 respondents who were examined using variations in *starting reading* time after substrate addition, namely at the 1st to 5th minutes. The examination was performed using the IFCC kinetic method, and the results were expressed in U/L. The data were analyzed descriptively and followed by the Friedman test. **Research Results**: The mean SGPT activity at *starting reading* times of the 1st, 2nd, 3rd, 4th, and 5th minutes was 10.17 U/L, 9.33 U/L, 9.00 U/L, 9.67 U/L, and 8.17 U/L, respectively. The highest mean value was observed at the 1st minute, while the lowest mean value was found at the 5th minute. The Friedman test resulted in an *Asymp. Sig.* value of 0.608 ($p>0.05$), indicating that there was no statistically significant difference among the variations in *starting reading* time. **Conclusion**: Variations in *starting reading* time from 1 to 5 minutes did not show a significant effect on SGPT test results under the conditions of this study.

Keywords: SGPT, starting reading time, time variation, IFCC kinetic method

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Introduction

Laboratory tests have a role in supporting the assessment of health conditions, including the evaluation of liver function. One of the parameters used in the examination is Serum Glutamic Pyruvic Transaminase (SGPT) or Alanine Aminotransferase (ALT). ALT activity can provide information that helps in assessing the state of hepatocellular and supports the evaluation of liver cell disorders (Tietz, 2018).

SGPT testing can be performed with an enzymatic approach using the kinetic method. The principle of this examination is based on the observation of absorbance changes that take place during enzyme reactions. Enzyme activity is then determined based on the speed of absorbance change in certain measurement intervals (Burtis and Bruns, 2015). The IFCC method also establishes certain conditions of examination and measurement to obtain reliable results of enzyme activity (Schumann et al., 2002). Thus, the accuracy of the implementation of the reading process is one of the things that needs to be considered in the SGPT examination.

The starting reading in this study refers to the time when the absorbance reading starts after the sample and reagent are mixed. In kinetic examination, the change in the initial time of observation causes the reaction to be observed at different time points. The difference can theoretically be related to the measured change in absorbance and subsequently affect the value of enzyme activity.

The quality of laboratory tests is influenced by various stages and factors that can cause variations in results. Therefore, control of analytical factors is needed to maintain the accuracy and consistency of test results (Plebani, 2017). In enzymatic tests, several aspects that need to be controlled include reading time, temperature, reagent condition, and measurement process.

The *reading starting time* is one of the parts that needs to be considered because it is related to the starting point of the observation of enzymatic reactions. When the reading starts at a different time, the observed reaction conditions can also be different. In the kinetic method, this situation has the potential to produce changes in absorbance values so that they can affect the SGPT activity obtained.

Based on these considerations, this study was conducted by providing variations in the *reading starting* time in the 1st, 2nd, 3rd, 4th, and 5th minutes after the addition of substrate. Examination was carried out on serum samples using the IFCC kinetic method to compare the SGPT activity obtained at each observation time.

Research on variations in *reading starting* times is important to find out whether differences in reading starting points result in changes in SGPT test results. Even though the test has used standardized methods, observation of the variation in reading time is still necessary to assess the consistency of the results obtained.

Research Methods

This study applied an *experimental static group comparison design* to compare the results of SGPT activity based on the difference in the initial reading time. The study involved 6 respondents with treatment in the form of variations *in starting reading* after the substrate was added, namely in the first, second, third, fourth,

and fifth minutes. SGPT activity was examined using the IFCC kinetic method and the measurement results were expressed in U/L units.

Research and Discussion Results

The data on the results of *the Serum Glutamic Pyruvic Transminase* (SGPT) examination at various variations of starting times can be read below:

Table 4.1 SGPT test results at various variations *of reading start* time

No	Sampel	Nilai SGPT sesuai Variasi Waktu *Starting* baca (U/L)				
		1 menit	**2 menit**	**3 menit**	**4 menit**	**5 menit**
1	R1	7 U/L	7 U/L	7 U/L	8 U/L	7 U/L
2	R2	9 U/L	9 U/L	9 U/L	10 U/L	8 U/L
3	R3	6 U/L	6 U/L	6 U/L	6 U/L	9 U/L
4	R4	24 U/L	19 U/L	20 U/L	18 U/L	5 U/L
5	R5	6 U/L	8 U/L	5 U/L	6 U/L	11 U/L
6	R6	9 U/L	7 U/L	7 U/L	10 U/L	9 U/L
	Total	61 U/L	56 U/L	54 U/L	58 U/L	49 U/L
	Rerata	10,17 U/L	9,33 U/L	9,00 U/L	9,67 U/L	8,17 U/L

Based on Table 4.1, the value of SGPT activity obtained was not completely the same for each respondent and at each reading starting time. The difference in value was seen in the variation in measurement results from the first minute to the fifth minute.

Table 4.2 Friedman Test Results

Parameter	Value
N	6
Chi-shcuare	2,710
df	4
Asymp. Sig.	0,608

The results of the analysis using the Friedman test showed a Chi-Square value of 2.710 with an Asymp. Sig. of 0.608. Because the p-value was above the significance limit of 0.05, the variation *in starting reading* from the first minute to the fifth minute did not show a statistically significant difference in SGPT results.

The highest average SGPT value in this study was found at the first minute *reading time*. This condition can be attributed to the state of the enzymatic reaction that is still in the early stages when the measurement begins. In the kinetic method, enzyme activity is obtained based on changes in absorbance in an observation period. Thus, changes in the initial reading time can cause observations to be made at different reaction conditions.

Although there was a difference in mean values between measurement times, the magnitude of the changes found was relatively limited. The pattern of results also did not show a consistent increase or decrease from the first to the fifth minute. Therefore, the numerical variation found was not sufficient to show a statistically significant change in SGPT activity.

Variations in enzyme test results are not only related to the reading time, but can also be influenced by various analytical aspects. Burtis et al. (2023) mention several factors that need to be considered, including pipetting accuracy, sample uniformity, reagent stability, and instrument performance. Therefore, small differences between the results in this study can be part of the analytical variation that occurs during the examination process.

The findings are in line with Keleş (2022), who showed that an automated clinical chemical examination system can still produce measurement variations even if the test is performed under controlled conditions. Thus, the relatively small change in SGPT values in this study cannot be directly interpreted as the main result of the difference in *reading starting* time.

The absence of statistically significant differences can be considered in relation to the use of the IFCC kinetic method which has standardized test conditions. Schumann et al. (2002) explain that the measurement of ALT activity with the IFCC procedure is carried out using predetermined reaction conditions and measurements so that the change in absorbance can be used to describe the catalytic activity of enzymes.

In this study, it was found that there was a numerical difference in SGPT values at some *reading starting* times. However, based on the results of statistical tests, these differences have not shown significant changes. This shows that under the conditions of the research conducted, the change in *reading starting time* from the first minute to the fifth minute has not provided evidence of a significant difference in the results of SGPT activities.

Conclusion

A. Conclusion

Based on the results of the study regarding the effect of the variation *in reading starting* time on the results of the Serum Glutamic Pyruvic Transaminase (SGPT) examination in 6 respondents, it can be concluded as follows:

1. The SGPT examination with *a starting reading* in the first minute produced an average value of 10.17 U/L.
2. The SGPT examination with *a starting reading* in the second minute showed an average value of 9.33 U/L.
3. At the *third minute of starting reading*, the average SGPT activity was obtained at 9.00 U/L.
4. The average SGPT examination result at the *starting reading* in the fourth minute was 9.67 U/L.
5. The examination with *a starting reading* in the fifth minute produced an average value of 8.17 U/L.
6. The results of the Friedman test obtained an Asymp. Sig. value of 0.608 ($p>0.05$). Thus, the variation *in reading starting* time from the first minute to the fifth minute did not show a statistically significant difference in the results of the SGPT examination.

B. Suggestions

1. For laboratories: SGPT examinations should still be carried out based on the applicable SOPs to maintain the quality and uniformity of examination results.
2. For laboratory personnel**:** The timeliness *of starting reading*, incubation time, and the suitability of the examination stages with the method used need to be considered to minimize variations in results.
3. For the next researcher: The next study can use a larger sample number and a wider range of *reading starting* variations so that the results obtained can provide a more representative picture.

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