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Comparison between Pooled Sera and Coomercial Serum on the Accuracy of Triglyceride Assessment

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Abstract

The increase in dyslipidemia cases every year requires the Clinical Chemistry laboratory to carry out quality control which is influenced by an assessment of accuracy and accuracy. These measurements were used with control materials. So far, in laboratories, there are still many commercial serum control materials used as controls that are used daily in triglyceride tests, and rarely use pooled sera. In fact, there are several advantages in using pooled sera as a control material. This type of analytic survey research with a comparative study method. The sampling technique used is purposive sampling. Data collection techniques were carried out using observation sheets. Data were processed computerized using univariate analysis and bivariate analysis using independent t-tests. The results showed that the average triglyceride examination value with Pooled Sera control material was 94.67 mg/dL with a Standard Deviation of 2.52, a coefficient value variance of 2.66%. While the results of triglyceride examination with Commercial Serum control material were 79.13 mg/dL with a Standard Deviation of 3.57, the coefficient of variance was 4.51%. It was concluded that there is a significant difference between triglyceride examination using Pooled Sera and Commercial Serum. It is recommended that there be developments in medical laboratory technology in hospitals, making this research a reference in educational institutions, and further research on other parameters between Pooled Sera ingredients and other Serum.

Keywords: Triglyceride, Pooled Sera, Commercial Serum

Introduction

Triglycerides are a type of fat in the body that circulates in the blood and various body organs. Monitoring triglycerides means monitoring fat levels which have the potential to increase the risk of cardiovascular disease, such as heart disease and stroke. Checking triglyceride levels can help change healthy lifestyle patterns and lifestyles (Hardisari & Khoiriyah, 2016).

Clinical Chemistry Laboratories need to carry out quality control which is influenced, among other things, by assessing accuracy and precision. These measurements are used with control materials (Ministry of Health of the Republic of Indonesia, 2015). The control substance that is often used in Clinical Chemistry laboratories today is commercial control serum, which is serum made from animal and human sera. The advantage of this type of control material is that it is more durable, can be used for all tests, no need to make your own.

The drawback is that sometimes there are variations from bottle to bottle plus errors in reconstitution, often serum taken from animals which may not be the same as human serum. Based on the Good Laboratory Practice guidebook (WHO, 2001) in the Guidelines for Correct Health Laboratory Practices (Ministry of Health RI, 2008) apart from commercial control materials, there are also self-made control materials, one of which is pool serum. Control materials made from serum are also called pooled sera. Pooled sera is a mixture of residual patient serum that is sent to the laboratory every day.

According to Muslim, et al (2015), the advantages of this serum collection include: easy to obtain, cheap, ingredients derived from humans, no need to be reconstituted (reconstitution), and the laboratory knows the origin of the control ingredients. The drawbacks are the method of storage at -700C (deep freezer), the stability of some of its components is not guaranteed (eg enzyme activity, bilirubin, etc.) and the danger of infection is very high, so that the preparation of collection serum must be done carefully according to laboratory safety guidelines because this material not necessarily free from HIV, HBV, HCV and others.

Salma et al (2019) research on cost-effectiveness, the use of commercial control materials as controls is more cost-effective than the use of pool serum as controls. Jamtsho R's (2013) research also concluded that commercial serum was more effective. Meanwhile, research by Haile B et al (2020) states that pooled sera is a good substitute for commercial serum, especially for developing countries. The same thing was also expressed by Kulkarni, Pierre & Kaliaperumal (2020), that internal Quality Control (QC) made from collected sera is better than commercial internal QC. Therefore, laboratory examination plays an important role in establishing a diagnosis, especially accuracy in triglyceride examination.

Literature Review

Triglycerides (triacylglycerols) are the main fats in food. This material is digested into fatty acids and 2-monoacylglycerol which will be resynthesized into triglycerides in the intestinal epithelial cells, then form chylomicrons and be secreted via the lymph into the blood circulation. The fatty acids from chylomicrons undergo oxidation to form energy for various tissues and are mostly stored as triglycerides in adipose cells (Smith, 2005)

The commonly used triglyceride examination method is the enzymatic colorimetric test method using glycerol-3-phosphate. Triglycerides are determined by enzyme hydrolysis with fat. The quinoneimine indicator is formed from hydrogen peroxide, 4-aminoantypyrine and 4-chlorophenol under the influence of a peroxidase catalyst. In this method, triglycerides will be reacted to produce glycerol and then read as a color spectrophotometer reaction (Murray, Granner, & Rodwell, 2009).

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In the Muslim journal, M., Kustiningsih, Y., Yanuarti, E. (2015): The results of calculating the CV (coefficient of variation) of the serum pool were 5.4% and the CV of control serum was 11.6%. The CV value of the serum pool is closer to the maximum CV value of 5%, so that the accuracy of the serum pool as a control for blood glucose examination is closer to the maximum CV than the control serum. The conclusion of this study is that the accuracy of glucose testing using pooled sera is higher than control serum.
A journal of Clinical Chemistry managed by The American Association of Clinical Chemists investigated control sera with 20 different commercial enzymic kits for measuring cholesterol in 19 commercial control sera and in pooled human serum specimens. The aim is to choose a more accurate serum between sera and commercial serum. Based on the correlation coefficient and regression equation, the control sera that were most suitable for measurement accuracy were all based on human serum (pooled sera), with cholesterol concentrations of more than 5 mmol/L. It was animal sera with lipid values above normal that seemed to be the less reliable control sera. reliable in this regard.

Research Method

Research on the comparison of commercial serum and pooled sera on the accuracy of triglyceride examination was carried out in February – March 2021 at the laboratory of RSU Mayjen H.A Talib Kerinci. The population in this study was a collection of serum (not hemolyzed, icteric, and not cloudy) from patients, both male and female, whose triglyceride levels were normal to be used as a control material for Pooled Sera, and Commercial Serum at RSU Mayjen H.A Talib Kerinci. The samples or research subjects in this study were pooled control material and commercial serum at RSU Mayjen H.A Talib Kerinci where each serum was taken 30 times for triglyceride examination.This type of analytic survey research with a comparative study method. Namely looking at how accurate the commercial control serum is with pooled sera, by comparing it to triglyceride examination The sampling technique used is purposive sampling. Data collection techniques were carried out using observation sheets. Data were processed computerized using univariate analysis and bivariate analysis using independent t-test and the data was processed using SPSS.

Result

Results of triglyceride examination with pooled sera control material

Table 1
Results of Triglyceride Examination with the control material Pooled Sera at RSU Mayjen H.A Talib Kerinci in 2021

Variable	Mean	SD	Min-Max	CV	n
Pooled Sera	94.67	2.52	90-98	2.66	30

Based on the data above, it is known that the average value of triglyceride examination with Pooled Sera control material is 94.67 mg/dL with a Standard Deviation of 2.52, the coefficient of variance is 2.66%, the minimum value is 90, while the maximum value is 98.

Results of triglyceride examination with commercial serum control materials

Table 2
Examination results of triglycerides with serum control materials commercial at Major General H.A Thalib Kerinci General Hospital in 2021

Variable	Mean	SD	Min-Max	CV	n
Serum Komersial	79.13	3.57	73-90	4.51	30

Based on the data above, it is known that the average value of triglyceride examination with the Commercial Serum control material is 79.13 mg/dL with a Standard Deviation of 3.57, a coefficient of variance value of 4.51%, a minimum value of 73 and a maximum value of 88.

Comparison between Pooled Sera and Commercial Serum on the Accuracy of Triglyceride Examination

Table 3
Comparison between Pooled Sera and Commercial Serum on the Accuracy of Triglyceride Examination at RSU Mayjen H.A Talib Kerinci in 2021

Variable	t	df	Sig. (2-tailed)	Mean Differ-ence	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Comparison of Triglyceride Test	19.463	58	0.000	15.5333	0.79808	13.9358	17.1309
	19.463	52.195	0.000	15.5333	0.79808	13.932	17.1347

Based on the Independent Sample T-Test, the Pvalue or Sig value was obtained. (2-tailed) < α (0.05) which is 0.000. So it can be concluded that Ha is accepted because of the Pvalue or Sig value. (2-tailed) < 0.05, meaning that there is a significant difference between triglyceride examination using Pooled Sera and Commercial Serum.

Discussion

Results of triglyceride examination with pooled sera control material

Based on the research results, the mean Pooled Sera value obtained from 30 examinations was 94.67 mg/dL and SD ± 2.52, CV (coefficient of variance) was 2.66% of the maximum CV value, namely 5%. Based on triglyceride examination data using the Pooled Sera control material, the maximum value is 98 and the minimum value is 90. The reference value for the Pooled Sera control material in this study is 36 – 126. So it can be concluded that the results of the examination of the Pooled Sera control material are accurate. This is in line with research by Risha (2018) on comparing the results of triglyceride examination of serum pool control materials with commercial control serum with an average serum pool examination result of 95.42 mg/dL with a CV value of 2.37%, and concluded that the serum pool has high accuracy. as a control material for triglyceride examination.

Triglyceride test results with commercial serum control materials

Based on the research results, the mean value of commercial serum obtained from 30 examinations was 79.13 mg/dL and SD ± 3.57, CV (coefficient of variance) was 4.51%. Based on the accuracy, from the reference value for commercial serum control materials in this study, namely 36 – 126, it is concluded that the results of the examination of commercial serum control materials are accurate. However, it lacks precision as indicated by the CV value of 4.51%, which is close to the maximum CV value of 5%. The results of Risha's (2018) research which obtained a CV value of 6.26%, the researcher concluded that serum ingredients that were different from the serum being examined affected the accuracy of the results.

Comparison between pooled sera and commercial serum on the accuracy of triglyceride examination

Based on the results of the independent T statistical test, the Pvalue significance value was 0.000, which means the PvalueSig value. (2-tailed) < 0.05, then Ha in this research is accepted, which means there is a difference in the accuracy value of triglycerides using Pooled Sera and those using Commercial Serum. This is in line with research by Amalia, Handayati & Santoso (2018) that there is a difference in value accuracy of blood glucose levels between commercial control serum with abnormally high levels, brand A (sera) and brand B (animal serum), this is shown by the significance value Pvalue<0.05. Kustiningsih & Yanuarti (2015), PooledSera which is used as a control material in glucose examination has good quality. The calculation results of the CV (coefficient of variation) of Pooled Sera were 5.4% and the CV of commercial control serum was 11.6%. The CV value of Pooled Sera is closer to the maximum CV value of 5%, so it is concluded that the accuracy of Pooled Sera as a control material for blood glucose examination is better than commercial serum.

Conclusion

1. The average triglyceride level of the pooled serum control substance was 94.67 mg/dL
2. The average triglyceride level of the commercial control substance was 79.13 mg/dL

3. There is a significant difference in the results of triglyceride examination of Pooled Sera ingredients and Commercial Serum ingredients.

References

Handayati, A., & Santoso, A. P. (2018). Nilai Akurasi Kadar Glukosa DarahAntara Serum Kontrol Komersial Level Abnormal Tinggi Merek A Dan Merek B. *Jurnal Ergasterio* , 50-57.

Hardisari, R., & Khoiriyah, B. (2016). Gambaran Kadar Trigliserida (Metode Gpo-Pap) pada Sampel Serum dan Plasma EDTA. *Jurnal Teknologi Laboratorium* , 27-31.

Kharistik, Y., Lanti R, Y., & Wekadigunawan, C. (2018). Path Analysis on the Psychosocial Impact of Obesity or Overweight in Adolescents in Surakarta, Central Java. *Journal of Epidemiology and Public Health* , 105-117.

Kulkarni, S., Pierre, S. A., & Kaliaperumal, R. (2020). Efficacy of Pooled Serum Internal Quality Control in Comparison with Commercial Internal Quality Control in Clinical Biochemistry Laboratory. *Journal of Laboratory Physicians* , 191-195.

Muslim, M., Kustiningsih, Y., & Yanuarti, E. (2015). Pemanfaatan Pool Serum sebagai Bahan Kontrol Ketelitian Pemeriksaan Glukosa Darah. *Medical Laboratory Technology Journal* , 54-60.

Risha, F. M. (2018). Membandingkan Pool serum dan Serum Kontrol Komersial dalam akurasi pemeriksaan Trigliserida. *Skripsi* .

Salma, F. D., Rahayu, I. G., & Rinaldi, S. F. (2019). Cost- Effectiveness Analysis (CEA) Bahan Kontrol Komersial dan Pool Serum Pasien. *Jurnal Riset Kesehatan* , 293-298.

Smith, J. (2005). *Introduction to Chemical Engineering Thermodynamics.* Boston: McGraw-Hill.

Tuna, H., & Widyaningsih, A. (2016). Perbandingan Antara Bahan Kontrol Komersial Merk Diasys-Trulab N Dengan Siemens-Biorad Level 1 Terhadap Akurasi Untuk Pemeriksaan Glukosa, Kolesterol Dan Asam Urat . *Jurnal Wiyata* , 85-91.