

The Difference of Chloride Levels from Blood Serum Centrifuged at 3662 Rpm Speed for 10 Minutes and 20 Minutes

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Abstract: Chloride is the main anion of extracellular fluid. One of the methods that must be considered in pre-analytical stage of chlorides processing the examination material. The method of chloride examination is ISE (Ion Selective Electrode) by using Easylyte. This study aims to determine the difference of chloride levels from blood serum centrifuged at 3662 rpm speed for 10 minutes and 20 minutes. This study is a pre-experimental using a *Static Group Comparison Design*. The normal test result of centrifugation for 10 minutes is $0.921 > 0.05$ and for 20 minutes is $0.203 > 0.05$ which means that the data is normally distributed. The result of statistical analysis of T-Test (paired T-Test) shows $p = 0.125$, and $\alpha = 0.025$ ($p > \alpha$). It means that there is no difference between chloride levels from blood serum that is centrifuged at 3662 rpm speed for 10 minutes and 20 minutes. This study concludes that there is no significant difference of chloride levels between centrifugation at 3662 rpm for 10 minutes and 20 minutes.

1 INTRODUCTION

Electrolytes are compounds that consist of positive or negative charged solution. Most metabolisms need electrolytes. Metabolisms are also affected by electrolytes (Yaswir, 2012). According to Burtis *et al* (2008), electrolytes mostly consist of anions and cations. Anion electrolytes include Cl^+ , HCO_3^- , $\text{H}_2\text{PO}_4^{2-}$, while cations include Na^+ , K^+ , Ca^+ and Mg^{2+} .

Chloride is the most common anion found in extracellular fluid. Chloride is excreted and reabsorbed along with sodium in the kidney. In normal condition, on average adults consume 50–200 mEq/L of chloride per day and excreted around 1-2 mEq/L of chloride through feces (Yaswir, 2012). Chloride assessment is used to observe chloride and other electrolyte levels. Chloride assessment material is serum obtained from venipuncture. The blood in test tubes were frozen at room temperature for 20-30 minutes, then centrifuged at 3000 rpm for 5-15 minutes (KepMenKes No 1792, 2010).

Centrifugation speed used in specimen processing was 1500 g with 10 cm rotor radius,

which was converted into 3622 rpm for 10 minutes (WHO 2nd revision, 2002). According to WHO, the minimum centrifugation time in chloride examination is 10 minutes. WHO does not state the maximum time in chloride examination. Therefore, the author selects 20 minutes as the time limit to measure whether chloride level is still within normal limit or not.

Centrifugation is a technique to separate materials based on molecular weight under certain speed. This separation technique is used to separate or purify proteins, particles, or cellular organelles sedimented according to their relative size and shape (Bintang, 2010). This study employs Easylyte as a device to examine chloride level in serum. The principle of Easylyte in measuring sodium, potassium, lithium chloride, calcium, pH, biological fluid is an ion technology selective. Selective electrodes develop variable voltages responded by ion concentration. The correlation between developed voltage and responsive ion concentration was logarithmic.

This study aims to determine any differences of chloride levels in serum centrifuged at 3662 rpm for 10 minutes and 20 minutes.

2 SUBJECTS AND METHODS

The samples were obtained from venous blood through vacuum system as the following : Verify preparation by recording medications consumed or other preparation factors that may affect examination such as diet and fasting, place needle in the holder, place tourniquet at approximately 3-4 fingers above the cubital fossa. After the subjects were asked to clench their hands, disinfect the skin around the area with 70% alcohol pad and let it dry. Position the holder with needle hole facing upwards. Perform venipuncture by inserting needle to vein lumen. Afterwards, the tourniquet is released.

Meanwhile, specimen processing procedure is as follows: Blood specimens were left for 20-30 minutes at room temperature, then centrifugation process was performed to separate serum from the blood at 3662 rpm for 10 minutes and 20 minutes. Sample analysis steps are as follows: place 100 µl serum to serum cup, the device display will show, "analyze blood?", press "yes" then sample probe will come down. Insert probe sample to serum cup then press "yes". Let the suctioning process finished, then probe will come back up and the device will analyze samples. Analysis results were shown on the device's display. Chloride level analysis was performed using EasyLyte device with ISE (Ion Selective Electrode) method (Riswanto, 2013).

3 RESULTS AND DISCUSSION

Based on chloride level analysis from serum centrifuged for 10 and 20 minutes at 3662 rpm as shown in Table 1, mean, minimum, maximum, and standard deviation (SD) values were obtained.

Table 1. The Results of examination of chloride concentrate for 10 minutes and 20 minutes.

Sample Code	Concentrated chloride levels for 10 minutes	Concentrated chloride levels for 20 minutes
1	107.30	107.50
2	104.10	103.40
3	105.30	105.50
4	106.00	106.40
5	105.80	104.80

6	105.90	105.50
7	106.20	105.30
8	106.10	105.80
9	108.40	108.00
10	108.80	108.40
11	103.00	102.20
12	105.40	105.80
13	104.90	105.70
14	105.30	105.30
15	102.10	103.30
16	107.30	108.60
17	103.70	105.30
18	102.50	103.70
19	103.70	105.30
20	101.70	102.90
21	104.90	104.50
22	106.90	107.70
23	104.90	105.70
24	105.70	105.70
25	104.50	105.30
26	102.90	103.70
27	102.50	103.70
28	104.90	105.70
29	101.30	102.50
30	103.30	103.70
31	102.90	102.90
32	104.50	104.50
33	104.50	104.10
34	105.40	103.80
35	106.30	106.20
36	106.20	105.80
37	103.20	102.80
38	107.20	107.10
39	105.40	105.40
40	104.50	104.70
41	104.30	103.70
42	106.50	106.10
MEAN	104.90	105.09
MIN	101.30	102.20
MAX	108.80	108.60
SD	1.7547	1.6019

Chloride level centrifuged for 10 minutes had an average of 104.90 ± 1.7 mEq/L, minimum value of 101.30 mEq/L, and maximum value of 108.80 mEq/L. Meanwhile, chloride level centrifuged for 20 minutes showed mean value of 105.09 ± 1.6 mEq/L, minimum value of 102.20 mEq/L, and maximum value of 108.60 mEq/L.

The dependent variable in this study was chloride level and the independent variable in this study was serum centrifuged at 3662 rpm for 10 and 20 minutes. Chloride level analysis was performed using ISE (Ion Selective Electrode) with Easylyte automatic device that has been conducted through method verification test, i.e. precision and accuracy.

Method verification result in chloride analysis showed that chloride analysis method can be used because precision/CV value obtained was below maximum CV (2%), both in within day precision (0.3%) and between day precision (0.79%) and accuracy/bias value (0.08%) obtained was below maximum bias (8%). Results of chloride level in blood serum centrifuged at 3662 rpm for 10 minutes showed mean value of 104.90 mEq/L which was close to chloride level in blood serum centrifuged at 3662 rpm for 20 minutes with mean value of 105.09 mEq/L. Statistical analysis using paired T-test showed p value = 0.125 with α value = 0.025 ($p > \alpha$) which means that there was no significant difference of chloride levels in blood serum centrifuged at 3662 rpm for 10 and 20 minutes.

4 SUGGESTION

Further studies are needed by using different electrolyte parameters and variation of different centrifugation speed and duration.

5 CONCLUSION

According to the result of chloride level analysis in blood serum centrifuged at 3662 rpm for 10 minutes and 20 minutes, this study concluded that there was no difference of chloride levels in blood serum centrifuged at 3662 rpm for 10 minutes and 20 minutes.

REFERENCES

- Bintang M (2010). Biokimia Teknik Penelitian. Jakarta :Gelora Aksara Pratama.
- Burtis CA, Ashwood ER, Burns DE (eds) (2008). Tietz Fundamentals of Clinical Chemistry.Sixth edition. Missouri: Saunders Elsevier.
- KepMenKes RI No 1792 (2010). Pedoman Pemeriksaan Kimia Klinik. Diakses 18 Agustus 2016.
- Pertiwi D. (2009). Perbandingan Hasil Pemeriksaan Na, K, Cl antara Penampungan Spesimen Menggunakan Tabung Kaca dan Tabung Pemisah Serum. Bagian Patologi Klinik Fakultas Kedokteran Universitas Islam Sultan Agung Semarang 1(2).
- Riswanto (2013). Pemeriksaan Laboratorium Hematologi. Yogyakarta : Alfa Media Kanal Medika.
- WHO (2002). Use Of Anticoagulants In Diagnostic Laboratory Investigations revisi 2. Diakses 30 Desember 2014.

Yaswir R dan Ira F (2012). Fisiologi dan Gangguan Keseimbangan <Natrium, Kalium. Dan Klorida serta Pemeriksaan Laboratorium. Jurnal Kesehatan1(2): 80 – 85.