Vol 8 No. 1 (2023) 226-235 ISSN (Online) : 2502-0943

Jurnal Katalisator

SUGAR LEVELS AND PROTEIN LEVELS OF URINE SAMPLES DECREASED DUE TO THE DELAY OF EXAMINATION OF 1 HOUR AND 2 HOURS.

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STIKES Sedza Syantika

Detail Artikel

Diterima : 4 April 2023
Direvisi : 18 April 2023
Diterbitkan : 19 April 2023

Kata Kunci

Kadar gula urin
Kadar protein urin
Analisa urin

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Abstrak

Kadar gula dan kadar protein dalam sampel urin dapat berubah seiring waktu setelah pengambilan sampel. penundaan tersebut dapat mempengaruhi stabilitas atau degradasi komponen-komponen dalam urin, termasuk gula dan protein. Beberapa penelitian telah dilakukan sehubungan dengan penundaan itu seperti perbedaan lama waktu penundaan. Tetapi informasi bahwa penundaan mempengaruhi kadar gula dan kadar protein sampel, belum banyak dipelajari. Tujuan penelitian adalah menganalisa kadar gula dan kadar protein sampel urin yang mengalami penundaan pemeriksaan. Penelitian ini adalah penelitian laboratorium, dengan sampel adalah urin. Karena nya dilakukan uji etik clearance. Analisis Kimia urin yaitu pengukuran komponen kimia dalam urin, yaitu gula (glukosa), protein, asam urat, keton, bilirubin, nitrit, dan pH urin. Analisis kimia dapat membantu dalam diagnosis penyakit atau kondisi tertentu, seperti diabetes, penyakit ginjal, infeksi saluran kemih, atau gangguan hati. Hasil nya kadar urin dan kadar protein turun setelah penundaan pemeriksaan selama 1 jam dan 2 jam. Penundaan pemeriksaan menurunkan kadar gula dan kadar protein sampel urin. Dengan memahami perubahan kadar gula dan protein yang dapat terjadi selama penundaan pemeriksaan urin, praktisi kesehatan dapat membuat keputusan yang lebih tepat dalam diagnosis dan pengelolaan pasien.

Kata kunci. Kadar gula urin. Kadar protein urin, Analisa urin,

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

Jurnal Katalisator Vol 8 No. 1 (2023) 226-235

Abstract

The sugar levels and protein levels in a urine sample may change over time after sampling. Such delays can affect the stability or degradation of components in the urine, including sugar and protein. Several studies have been conducted concerning that delay such as the difference in the length of time of the delay. But the information that the delay affects the sugar content and protein content of the sample, has not been studied much. The purpose of the study was to analyze the sugar levels and protein levels of urine samples that experienced delayed examination. This study was a laboratory study, with the sample being urine. Because of this, a clearance ethics test was carried out. Chemical Analysis of urine is the measurement of chemical components in urine, namely sugar (glucose), protein, uric acid, ketones, bilirubin, nitrite, and urine pH. Chemical analysis can help in the diagnosis of certain diseases or conditions, such as diabetes, kidney disease, urinary tract infections, or liver disorders. The result was that urine levels and protein levels dropped after a delay in examination for 1 hour and 2 hours. Postponement of the examination lowers the sugar level and protein content of the urine sample. By understanding the changes in sugar and protein levels that can occur during delayed urine examinations, healthcare practitioners can make more informed decisions in the diagnosis and management of patients.

Keywords. Urinary sugar content. Urine protein levels, Urine analysis,

INTRODUCTION

The chemical content of urine consists of most of the water, which is 95%-98% of the total volume of urine. In addition, urea is a waste product of nitrogen from the breakdown of proteins in the body. It is this component that gives urine a characteristic odor. There is also Creatinine, a byproduct of muscle metabolism that is excreted through the kidneys. Creatinine in urine is often used to measure kidney function. Another component is uric acid which is the result of the metabolism of nucleic acids and purine bases in the body. Last is the urobilinogen pigment [1], [2]. Normal urine consists of water, urea, creatinine, lactic acid, uric acid, phosphoric acid, sulfuric acid, and chloride. The composition of substances in the urine will vary depending on the type of food and water it drinks. While in certain conditions can be found excessive substances such as vitamin C

Urine is a waste substance that is removed from the body by the kidneys during the excretion process. Urine examination can show a person's health problems [3],[4]. Urine glucose testing is still used as a way to evaluate a person's initial health condition. This can help identify diabetes mellitus or other glucose metabolism problems [5].

Natural biochemical processes that occur in urine, such as enzymatic or oxidation, can affect the stability and change of components in urine over time. Like if urine is left for a long time, then bacteria will multiply and multiply. These numerous bacteria can decompose NH_3.

http://doi.org/10.22216/jk.v5i2.5717
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Jurnal Katalisator Vol 8 No. 1 (2023) 226-235

NH3 will react with H2O to produce NH4OH which is alkaline. The alkaline pH of urine can increase, which can cause erythrocytes, leukocytes, and cylinder components to become more rapidly lysis, so their number will decrease [6],[2].

Extensive medical research shows that patients, with high protein concentrations in the urine, have different types of kidney disease, referred to as proteinuria. Automatic proteinuria and / or hematuria are the hallmarks of chronic glomerulonephritis. Proteinuria can be detected in urine, and it is the only method available for diagnosing ginja disease in adults. For diagnostic purposes, accurate and consistent total protein urinalysis is essential. Due to the complexity of urine, it generates challenges for the treatment of proteins and other analytical constituents[7]. [8], [9].

The storage temperature of a urine sample can also affect the stability and integrity of components in the urine. Improper temperature can lead to chemical changes and degradation of proteins in the sample, so the examination is directed at analyzing tissue samples [10].

Bacterial contamination in a urine sample can lead to changes and degradation of components in the urine. Enzymatic activity by bacteria and interactions with microorganisms can affect levels of proteins and other components and can also cause infection [11], [12]. How long the delay, which affects sugar and protein levels, is not widely known.[13], One of them, who studied delays of examination for 1, 2 and 3 hours, which resulted in a delay of 3 hours, found differences in the number of urinary leukocytes in patients with urinary tract infections. The others are: [14], learn that delaying causes an increase in the number of bacteria. With the time of delay, bacteria can multiply. So the number of bacteria is not the number of bacteria in the urine.

Sugar levels and protein levels and others, decreased at the time of the 1-hour and 2-hour examination delays are also not widely known [15], One that studied the delay where it could be found that there was no difference in results between fresh urine and two-hour delayed urine in urine samples of diabetes mellitus patients using the dipping method. The changes that occur in the urine are caused by bacteria whose place or container is not clean, this can change the difference in the results of fresh urine glucose examination and urine delayed two hours in the sample [16].

Further research remains to be done as to the factors affecting changes in sugar and protein levels in urine samples during delays such as ambient temperature, storage methods, use of preservatives, or special storage conditions may play an important role in the stability and integrity of urine samples.

It is not yet fully understood how changes in sugar and protein levels in urine samples can interact with other components such as urine pH, chemicals, or microbiological components.

For this reason, it is necessary to conduct a study that analyzes sugar levels and protein levels of urine samples that delay examination for 1 hour and 2 hours.[17].

It is necessary to study how changes in sugar and protein levels in urine samples interact with other components such as urine pH, chemicals, or microbiological components

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METHODOLOGY

The sample is urine as much as 50 urine samples from Medilab Batam Clinic.

Analysis of sugar levels in urine at 0 hours, 1 hour and 2 hours Quantitatively using Biochemical Methods, namely the Benedict method. This method is based on the reaction of sugar reduction with benedict reagents, resulting in a precipitate or discoloration directly proportional to the sugar content in the urine. The sugar content can then be measured spectrophotometrically.

Procedural

This test is copper(II) sulfate, which is reduced in the presence of several compounds to produce a precipitate of copper(I) oxide, and also changes the color of the solution. This method is a chemical technique used to test for the presence of reducing sugars in a solution. It is a test commonly used to test for the presence of glucose in solution, and is often used in the context of analytical chemistry, clinical chemistry, and laboratory biology.

The way it works is as follows:

The urine sample solution is mixed with the test solution with Benedict's solution in a test tube. Then heat the test solution and Benedict solution. Typically, heating is done in boiling water with a temperature of about 80-100 degrees Celsius (176-212 degrees Fahrenheit). Heating is an important step because it helps the chemical reaction between the reducing sugar in the test solution and the Benedict solution. During heating, observe the discoloration of the mixture. If there is reducing sugar in the test solution, the mixture will change color from blue to green, yellow, or even red, depending on the sugar concentration. This discoloration indicates the presence of reducing sugars in the test solution.

In addition , analysis of protein levels in urine using the Biuret Method: This method involves the reaction of proteins in the urine with biuret reagents that produce a purple complex. The intensity of the color formed correlates with the amount of protein in the urine sample and can be measured using a spectrophotometer.

RESULTS AND DISCUSSION

The results of this study were divided into 2 groups, namely, sample data as follows:

Table 1 Frequency distribution of positive urine glucose respondents by age range at Batam Medilab Clinic

AGE RANGE (YEARS)	*f*	PERCENTAGE (%)
41-45	5	16,7
46-50	9	30
51-55	5	16,7
56-60	5	16,7
>61	6	20
JUMLAH	**30**	**100**

Source: Data Obtained, 2021

http://doi.org/10.22216/jk.v5i2.5717
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Based on table 1, the most respondents occurred in the adult age range (46-50), which was 30%, the second most respondents occurred in the age range with the age range (41-45) which was 16.7%, then in the age range (51-55) which was 16.7%, in the age range (56-60) which was 16.7%, and the lowest respondents from the age range (>61) which was 20%.

Table 2 Frequency distribution of positive urine protein respondents based on age range at Medilab Batam clinic

AGE RANGE (YEARS)	*f*	PERCENTAGE (%)
41-45	7	23,3
46-50	12	40
51-55	4	13,3
56-61	5	16,7
>61 Years	2	6,7
AMOUNT	**30**	**100**

Source: Data Obtained, 2021

Based on table 2 the most respondents occurred in the adult age range (46-50) which is 40%, the second most respondents occurred in the age range with the age range (41-45) which is 23.3% then in the age range (56-61) which is 16.7%, in the age range (51-55) which is 13.3%, and the lowest respondents from the age range (>61) which is 6.7%.

Table 3 Frequency distribution of positive urine glucose respondents by sex at medilab batam clinic

GENDER	*f*	PERSENTASE (%)
MAN	19	63,3
WOMAN	11	36,7
AMOUNT	**30**	**100**

Source: Data Obtained, 2021

Based on table 3, respondents who are male are 63.3% and respondents who are female are 36.7%.

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

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Table 4 Frequency distribution of positive urine protein respondents by sex at Medilab Batam clinic

GENDER	*f*	PERSENTASE (%)
MAN	23	73,7
WOMAN	7	23,3
AMOUNT	**30**	**100**

Source: Data Obtained, 2021

Based on table 4, respondents who are male are 73.7% and respondents who are female are 23.3%.

1. The result of glucose substances in the urine
   a) Rata-rata hasil glukosa urine segar

results_glukosa_urine_segar

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(+)	8	23,3	23,3	23,3
	(++)	7	26,7	26,7	50,0
	(+++)	15	50,0	50,0	100,0
	Total	30	100,0	100,0	

In the spss output results, above it can be seen that:

From the data above, it can be concluded that the most average results of glucose examination in fresh urine are results (+++) with a percentage of 50% and the minimum data on urinalysis results is results (+) with a percentage result of 23.3%

1. Glucose results after a delay of 1 hour

results_glukosa_urine_After_1_hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(+)	8	26,7	26,7	26,7
	(++)	7	23,3	23,3	50,0
	(+++)	15	50,0	50,0	100,0
	Total	30	100,0	100,0	

After 1 hour of delay different results of glucose were obtained:

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

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From the data above, it can be concluded that the highest average result of glucose examination in fresh urine is the result (+++) with a percentage of 50% and the minimum data of urinalysis results is the result (+) with a percentage result of 23.3% of urine examination results from fresh urine to urine time delay of 1 hour does not change.

1 hour time unchanged.

b) glukosa after 2 hours

glukosa_after 2 hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(-)	7	23,3	23,3	23,3
	(+)	9	30,0	30,0	53,3
	(++)	14	46,7	46,7	100,0
	Total	30	100,0	100,0	

After a 2-hour delay results were obtained that differed from the results of a 1-hour delay urinalysis and fresh urine:

1. There were results (-) from urinalysis of glucose substances in the urine, which was 7 samples of 23.3% percentage which from the previous examination was absent
2. Results (+) also changed to 9 samples with a percentage of 30%
3. While the results (++) became 14 samples with a percentage of 46.7%
1. Conclusion from the table of average fresh urine urinalysis results, delays of 1 hour and 2 hours continue to change, namely experiencing a decrease in glucose results, the longer the examination, the greater the change in glucose results in urine.

A. hasil zat protein pada urin

a) the result of fresh urine protein substances

fresh_urine_protein_result

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(+)	21	70,0	70,0	70,0
	(++)	5	16,7	16,7	86,7
	(+++)	4	13,3	13,3	100,0
	Total	30	100,0	100,0	

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

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From the data above, it can be concluded that the most average results of protein examination in fresh urine are results (+) with a percentage of 70% and the minimum data on urinalysis results are results (+++) with a percentage result of 14.3%.

1. Protein results after a delay of urine examination 1 hour

urine_protein_result_after_1_hour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(+)	21	70,0	70,0	70,0
	(++)	5	16,7	16,7	86,7
	(+++)	4	13,3	13,3	100,0
	Total	30	100,0	100,0	

While the average result of delay after 1 hour did not experience protein changes with the results of fresh urine protein and from the data above it can be concluded that the most average results of protein examination in fresh urine are results (+) with a percentage of 70% and the minimum data of urinalysis results are results (+++) with a percentage result of 14.3%.

a) protein results after a 2 hour urine examination delay

protein_result_after_urine_result_2_hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(+)	1	3,3	3,3	3,3
	(++)	20	66,7	66,7	70,0
	(+++)	5	16,7	16,7	86,7
	(++++)	4	13,3	13,3	100,0
	Total	30	100,0	100,0	

After a 2-hour delay results were obtained that differed from the protein results from urinalysis 1 hour delay and fresh urine namely :

1) the result (+) decreased to 1 sample with a percentage of 3.3%
2) while the results (++) became 20 samples with a percentage of 66.7%
3) For results (+++) to 5 samples with a percentage of 16.7%

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

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4) There are results (++++) from urinalysis of protein substances in urine, which is as many as 4 samples of 13.3% percentage which from the previous examination is absent
5) Conclusion from the table of average results of fresh urine urinalysis, delays of 1 hour and 2 hours continue to change, namely an increase in protein results.

CONCLUSION

From the research that has been done, it can be concluded that the sugar levels and protein levels of urine samples decreased due to the delay in examination of 1 hour and 2 hours.

BIBLIOGRAPHY

[1] K. Kemalasari, M. A. Ifadah, and B. N. Iman, 'Alat Pendeteksi Kadar Glukosa pada Urine dengan Metode Naive Bayes', *J. Rekayasa Elektr.*, vol. 18, no. 4, pp. 208–215, 2022, doi: 10.17529/jre.v18i4.27238.
[2] R. P. Cahyany and M. A. Sodik, 'Pengukuran Kadar Glukosa Urin dengan Uji Benedict', *Stikes Surya Mitra Husada Kediri*, vol. 1, no. 1, pp. 1–5, 2018, [Online]. Available: https://osf.io/preprints/inarxiv/8952x/.
[3] Kamil, S. I. P, and Trisnawati, 'Pengaruh Waktu Penyimpanan Sampel Urin Selama 2 Jam Dan 4 Jam Pada Suhu 2-8Oc Terhadap Hasil Pemeriksaan Kimia Urin', *J. Med. Karya Ilm. Kesehat.*, vol. 2, no. 1, p. 6, 2019, [Online]. Available: http://jurnal.stikeswhs.ac.id/index.php/medika/article/view/77.
[4] C. M. Handojo, I. G. Soma, P. D. Jayanti, and K. A. Purnama, 'Penanganan Urolithiasis yang disertai Gangguan Fungsi Hati pada Anjing Pomeranian Usia Sembilan Tahun', *Bul. Vet. Udayana*, no. 158, p. 596, 2023, doi: 10.24843/bulvet.2023.v15.i04.p12.
[5] F. Dian Puspa Nadeak and dan Rosliana Lubis, 'Penentuan Kadar Glukosa Urine di Laboratorium Rumah Sakit Sari Mutiara Medan Determination of Urine Glucose Levels Laboratory of Sari Mutiara Hospital Medan', *J. Ilm. Biol. UMA*, vol. 1, no. 2, pp. 53–57, 2019, [Online]. Available: http://jurnalmahasiswa.uma.ac.id/index.php/jibioma.
[6] N. I. Fadhilah, *Hubungan Kadar Glukosa Darah dan Kadar Glukosa Urine Terhadap Onset Pada Penderita Diabetes Melitus Tipe II*. 2021.
[7] F. Yang, J. S. Shi, S. W. Gong, X. D. Xu, and W. B. Le, 'An equation to estimate 24-hour total urine protein excretion rate in patients who underwent urine protein testing', *BMC Nephrol.*, vol. 23, no. 1, pp. 1–8, 2022, doi: 10.1186/s12882-022-02673-2.
[8] S. Aitekenov, A. Gaipov, and R. Bukasov, 'Review: Detection and quantification of proteins in human urine', *Talanta*, vol. 223, no. P1, p. 121718, 2021, doi: 10.1016/j.talanta.2020.121718.
[9] H. S. Bekti, I. G. A. A. Dharmawati, and I. B. O. Suyasa, 'Penyuluhan Kesehatan serta Pemeriksaan Kadar Hemoglobin dan Protein Urin pada Remaja Putri', *Poltekita J. Pengabdi. Masy.*, vol. 4, no. 1, pp. 178–184, 2023, doi: 10.33860/pjpm.v4i1.1575.
[10] Q. Wu and R. A. Fenton, 'Proteomic approaches in kidney disease biomarker discovery', *Am. J. Physiol. - Ren. Physiol.*, vol. 315, no. 6, pp. F1817–F1821, 2018, doi: 10.1152/ajprenal.00421.2018.

http://doi.org/10.22216/jk.v5i2.5717
Published by LLDIKTI Wilayah X

[11] N. K. N. Pridayanti, M. S. Anthara, and S. K. Widyastuti, 'Infeksi Saluran Kemih Bawah Penyebab Azotemia Post-Renal pada Kucing Persia Campuran', *Bul. Vet. Udayana*, vol. 2, no. 158, p. 647, 2023, doi: 10.24843/bulvet.2023.v15.i04.p17.

[12] E. Suriani, R. Permatasari, and W. Yusnita, 'Kadar Albumin Serum Dan Protein Urine Pada Anak Penderita Sindrom Nefrotik', *Pros. Semin. Kesehat. Perintis*, vol. 4, no. 2, pp. 80–83, 2021, [Online]. Available: https://jurnal.upertis.ac.id/index.php/PSKP/article/view/714.

[13] A. Anwar, Eka Nurdinanty, Jais, 'Efek Delay', vol. 7, no. 1, pp. 7–12, 2019, doi: 10.33992/m.v7i1.646.

[14] Inayah Fitri, 'Pengaruh Variasi Lama Penundaan Pemeriksaan Terhadap Enumerasi Bakteri Pada Urin Penderita Infeksi Saluran Kemih (Isk)', *J. Biol. dan Pembelajarannya*, vol. 6, no. 2, pp. 12–14, 2019, doi: 10.29407/jbp.v6i2.14793.

[15] Yulianti, N. Bandu, and S. Thahir, 'Perbandingan Hasil Pemeriksaan Glukosa Urin Segar dan Urin Tunda Dua Jam pada Penderita Diabetes Melitus Metode Carik Celup', *J. Media Laboran*, vol. 8, no. 1, pp. 29–32, 2018.

[16] E. N. Anwar and A. Jais, 'Effect of Delayed Examination of the Morning Urine Sample After 3 Hours at Room Temperature', *ANJANI J. (Medical Sci. Healthc. Stud.*, vol. 1, no. 1, pp. 1–6, 2021, doi: 10.37638/anjani.v1i1.297.

[17] N. Masruroh and A. P. R. Santoso, 'Pemeriksaan Mean Arteri Pressure Dan Protein Urine Sebagai Prediksi Hipertensi Pada Ibu Hamil Trimester Iii Di Rs Prima Husada Sidoarjo', *J. Midwifery*, vol. 2, no. 2, pp. 52–59, 2020, doi: 10.24252/jm.v2i2a1.

http://doi.org/10.22216/jk.v5i2.5717
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