RESEARCH ARTICLE

False results perceptions of different urine parameters delaying one day for analysis

Abstract

Background: Numerous laboratory facilities are certainly challenging in scrutinizing great quantity of urinary samples that reach laboratory in the late evening and are frozen till next day. On the other hand, various clinics and small medical centers might face difficulties in guaranteeing same day test sample deliveries and analysis. As the stability of authentication of urinary test results from post ponding the samples creates much differences in results, mechanized dipstick investigation Supertron is anonymous, we repeated the tests from the overnight refrigerated urine samples and compared the characterizing accuracy.

Objectives: The purpose of this Clinical research is to identify the risk of having the false positive and negative results when urine analysis is delayed for almost one day due to different circumstances.

Method: Urine analyzer (Supertron) was used in this project and urine samples were tested through dipstick immediately after receiving the samples and were reanalyzed after one day refrigeration (4°C). Both results were compared using SPSS.

Results: Urine was analyzed for leukocyte esterase, hemoglobin, proteins, nitrites, ketone bodies and glucose values. Highly accurate values for leukocyte esterase were observed but the reactivity decreased to 25% of original after keeping for 24 hours. Hemoglobin accountability was observed to be high but similarly lowered with passage of 24 hours. Variation in results was observed for proteins quantifications and it raised. Analysis for glucose, ketones and nitrites also displayed variations in readings.

Conclusion: Comparing variation in urinalysis results of instantly handled samples with the 24 hours delayed ones displays a lot of variation in the final readings, which raises a lot of question in the authentication of these procedures and lab protocols. Our current study elucidates that variation occurs in the final readings if the sample is kept for 24 hours and false negative or false positive results about Leukocyte concentration, nitrates and proteins could be detected but no such difference was observed in case of glucose and ketones.

Keywords: hemoglobin, glucose, ketones, nitrates, dipstick

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Introduction

Diagnosing a disease and rational use of drug i.e. right drug at right time to right person at right dose is a necessity of a healthy society [1]. Sometimes it happens that a physician understands the disease of patient but undergoes diagnostic procedures like laboratory tests to confirm the opinion. Urine analysis or urine R/E is one of the most common diagnostic tools used by doctors, which is performed in laboratories [2]. This test gives complete picture of proteins, leukocytes, ketone bodies, glucose and nitrites. Similarly, Supertron urine analyzer is a complete computerized urinalysis method to semi quantifies assessments for glucose, red blood cells, nitrites, ketone and proteins [3]. It gives the results on the basis of color variation of different constituents of urine on strip. Strong color and weak color gives variable predictions of results. Inspite of high screening capacity of three hundred strips per hour raised working load to handle enormous urine samples delays working hours till late evenings, which could be troublesome [4]. Moreover, medical centers and hospitals from remote areas and widespread geological zones sometimes fail to deliver the diagnostic sample to the diagnostic lab in a quotidian pattern. It is well known that urine tests are steady for 1 hour on plate and the results from one day freezed urine samples are obscure [5]. Studies suggest analyzing the urine within 120 min [6-8]. In the current study, we have compared the urinalysis of immediately

analyzed samples with one day delayed frozen samples to identify the reliability on finding and difference in further treatment regimens **FIGURE 1** [9-11].

Material and Methods

Urine samples were collected in a sterile urine sample bottles and were analyzed within 4 hours of collection. 190 samples were analyzed in duplicated and 213 samples were analyzed in a single time run after collection and were repeated after 24 hours at 4°C for solutes concentration like glucose and proteins etc. by the automated analyzer equipment Supertron (Hitachi-Mannheim, Germany). Following this procedure, we tested 190 samples to calculate accuracy and all 403 (190+213) to confirm steadiness of samples [12,13]. Each component assertion of urinalysis was decided for distinctive degrees of analysis. Critical contrasts between precision and stability was estimated. Comparison between the test samples and estimated standards was done to identify the correctness of results.

Results

Highly accurate leukocyte esterase results are shown in **TABLE 1**, which became variated with the passage of time and displayed false positive results due to deterioration. The inadmissible changes in the final readings were >75% whereas the test analyzed as negative went a minor alteration in permanency. In addition to this, 25% of results for leukocyte esterase overdue for twenty four hours were read as negative false, tests for nitrates were together specific and steady as shown in **TABLE 1 AND FIGURE 1**.

When urine samples were analyzed for proteinuria, **FIGURE 2** indicates the false positive results for greater than 5000 mg/L, 1000 mg/L and 300 mg/L when samples were

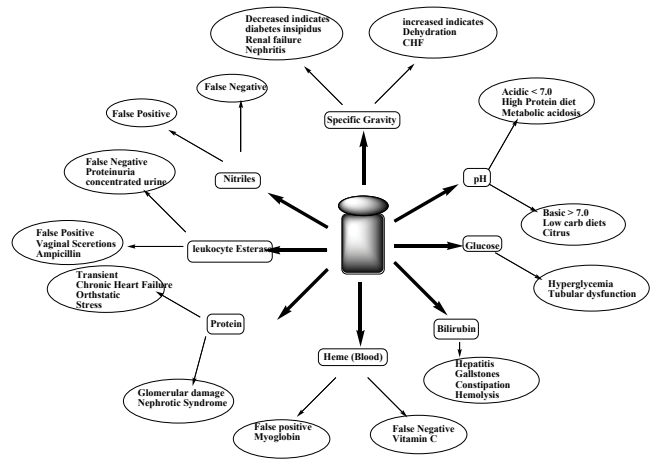

FIGURE 1. Showing different parameters of urine analysis.

TABLE 1. Indicating the tests to be analyzed and results.

Test	Result on same day	Result after 24 hours	Conclusion
Leukocytes Greater than 500 10^6/L	21	47	False positive
Leukocytes Greater than 75 10^6/L	49	75	False positive
Leukocytes Greater than 10 10^6/L	79	107	False positive
Nitrates	18	28	False positive

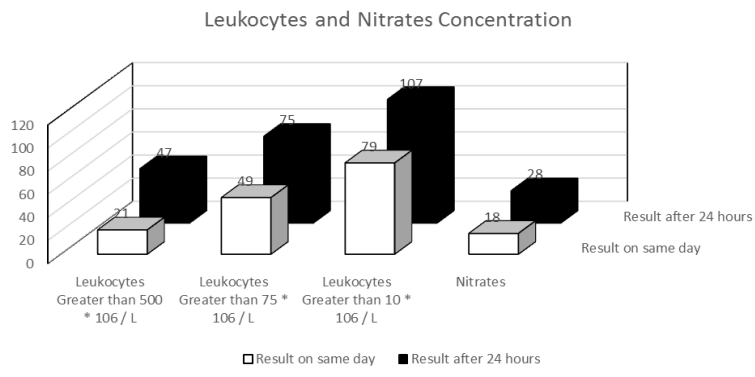

FIGURE 2. Showing comparison of sample before and after 24 hours.

TABLE 2. Indicating the concentration of testing specimen.

Test	Result on same day	Result after 24 hours	Conclusion
Proteinuria Greater than 5000 mg/L	7	11	False positive
Proteinuria Greater than 1000 mg/L	15	22	False positive
Proteinuria Greater than 300 mg/L	25	42	False positive
Glucose greater than 10000 mg/L	11	12	No big difference
Glucose greater than 1000 mg/L	16	17	No big difference
Glucose greater than 500 mg/L	5	7	No big difference
Ketones	3	3	No big difference

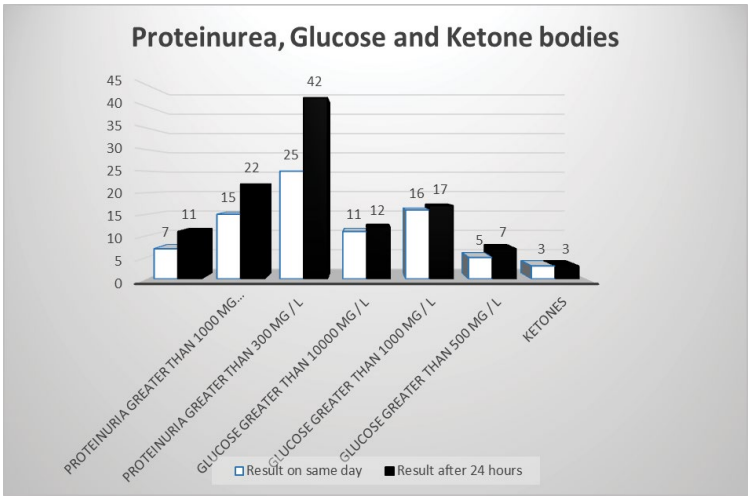

FIGURE 3. Expressing the concentration of different entities in Urine specimen

allowed to retain for one day. While in case of Glucose and ketone bodies, not much difference was observed when compared with immediate performed results **TABLE 2 AND FIGURE 3**.

Discussion

The results of this study identify that urine analysis for RBCs and WBCs shows variation if tested after one day. Results may become unsatisfactory as false positive or false negative during this time. On the other hand, No prominent differences among the precision and steadiness for urine ketone bodies, glucose concentration and nitrates were observed. Instant assessment-retest precision was objectionable for protein concentration, displaying higher values (false positive) when refrigerated for 24 hours.

Reflectance interpretations of urinalysis dip-sticks that are semi-automated are extra detailed than pictorial analyses and trainings of exactness through Miditron Junior to check the dipsticks bring into being that it was specific. Detailed examination justified that value of protein, glucose concentration and nitrates compounds in insincerely synthesized specimens also have great reproductivity, but results for haemoglobulin level in urine were less accurate.

High concentration of glucose i.e. 1000 mg/L was good to analyze but below deadline values it was very difficult to measure. The absence of correctness of glucose concentration in commercially obtainable dipsticks has shown good results. When comparing the measurable hexokinase technique, individually the Chem strip could distinguish glucose urine concentration at 0.29 g/L and 0.59 g/L.

Supertron dipsticks need to be preserved cautiously as their exposure to oxygen in open air leads to change of color and variation in results of constituents present and ultimately perception of loss of specificity. In this way, it can show glucose false positive results during first seven days and inaccurate and false negative results for blood in urine during one month time period.

Healthcare professionals and other first line warriors for treatment of diseases relay on the results of laboratories to completely diagnose and treat the ailment. The laboratory technicians also undergoes many circumstances to increase efficacy of results without adding more cost to the patient so that the precise information could be delivered at the right time to physicians and they would have a good decision about patient health.

Urinalysis involves a series of tests and results that are sometimes performed manually and automatically to quantify the constituents present in the urine. The main focus of this investigation is to apply different screening parameters to find the patients renal system problems and other metabolizing diseases. Urine analysis through dipsticks can be compare with other test strategies but this would be probably more beneficial than others due to high efficacy and precision than others but this could more justified by more protocols.

Conclusion

The present research comes out with the conclusion that performing urine test within time frame is one of the important area which the most laboratories and physicians lapse. The result of which suffers the innocent people and they may be treated for the disease which they do not have, due to false positive results. Same for those people which have the disease but the result comes false negative and they are not given treatment on time leading towards lethal.

References

El-Halees AM, Almadhoun MD. Different mining techniques for health care data case study of urine analysis test. *Int J Biomed Data Mining*. 6: 1-4 (2017).

Herman-Saffar O, Boger Z, Libson S, et al. Early non-invasive detection of breast cancer using exhaled breath and urine analysis. *Comput Biol Med*. 96: 227-232 (2018).

Culhane JK. Delayed analysis of urine. *J Fam Pract*. 30: 473-475 (1990).

Halstead AC, Godolphin W, Lockitch G, et al. Timing of specimen collection is crucial in urine screening of drug dependent mothers and newborns. *Clin Biochem*. 21: 59-61 (1988).

Chahar OP, Bundella B, Chahar CK, et al. Quantitation of proteinuria by use of single random spot urine collection. *J Indian Med Assoc*. 91: 86-87.

Rinehart BK, Terrone DA, Larmon JE, et al. A 12-hour urine collection accurately assesses proteinuria in the hospitalized hypertensive gravida. *J Perinatol*. 19: 556-558 (1999).

Kawasaki T, Ueno M, Uezono K, et al. Average urinary excretion of sodium in 24 hours can be estimated from a spot-urine specimen. *Jpn Circ*. 46: 948-953 (1982).

Somanathan N, Farrell T, Galimberti A. A comparison between 24-hour and 2-hour urine collection for the determination of proteinuria. *J Obstet Gynaecol*. 23: 378-380 (2003).

Chotayaporn T, Kasitanon N, Sukitawut W, et al. Comparison of proteinuria determination by urine dipstick, spot urine protein creatinine index and urine protein 24 hours in lupus patients. *J Clin Rheumatol*. 17: 124-9 (2011).

Miler M, Simundic AM. Low level of adherence to instructions for 24-hour urine collection among hospital outpatients. *Biochem Med (Zagreb)*. 23: 316-320 (2013).

Adebisi SA, Adekunle BA, Etu AK. Creatinine clearance: alternative approach to traditional 24-hour urine collection in normal individuals. *Afr J Med Med Sci*. 30: 27-30 (2001).

Neithardt AB, Dooley SL, Borensztajn J. Prediction of 24-hour protein excretion in pregnancy with a single voided urine protein-to-creatinine ratio. *Am J Obstet Gynecol*. 186: 883-886 (2002).

Edwards OM, Bayliss RI, Millen S. Urinary creatinine excretion as an index of the completeness of 24 hour urine collections. *Lancet*. 294: 1165-1166 (1969).