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KEY WORDS: TAT , Urinalysis , Urised 2 , Microscopy.

COMPARISON OF URISED 2 FULLY AUTOMATED URINE ANALYZER TO MANUAL URINE MICROSCOPY

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ABSTRACT

Introduction: Urinalysis is one of the most commonly performed test in the clinical laboratory. Urine screening is achieved by either automated or manual microscopic analysis. The objective of this study was to compare the results of fully automated urine analyzer to manual urine microscopy.

Material and Method : A total of 200 urine samples were analyzed by Urised 2 fully automated urine analyzer and manual method and the results were compared.

Result : The sensitivity for RBC was 89.2% , specificity was 93.3% respectively. The sensitivity for WBC was 86% , specificity was 91% in the study conducted on 200 urine sample.

Conclusion: The use of automated device in urinalysis is a good practice as it showed good compatibility to manual microscopy. However in order to avoid any error or uncertainity it requires careful evaluation and some images have to be analyzed by manual microscopic examination.

INTRODUCTION :

Chemical and microscopic testing of urine samples known as Urinalysis is one of the most commonly performed test in clinical laboratories in order to illuminate several diseases. The drive towards fully automated systems for urinalysis has generally been caused by the need to shorten the turn around time (TAT) and by the increased number of daily samples (1,2). The Kidney Early Evaluation Program (KEEP) recommends the use of urinalysis in daily clinical settings and underlines the importance of detecting hematuria and proteinuria as primary signs of kidney disease. Furthermore the evaluation of urinary erythrocyte morphology has been considered crucial to differentiate a glomerular from a non glomerular disease (3,4). Manual microscopic examination requires well trained and experienced staff and consumes a considerable amount of time. Therefore automated urine analyzers for high volume laboratories were developed in order to provide better standardization, improve the uncertainity of measurement and save staff time. Whereas both the manual and automation methods have advantages and disadvantages , the present study sought to compare the results obtained by using urised 2 automated urinalysis and manual methods in order to analyze counts as well as the ability to detect and identify urinary elements for the purpose of aid in the diagnosis of renal diseases and infections.

MATERIAL AND METHODS :

Freshly collected urine samples from 200 patients were used in this study. The samples were submitted for routine diagnostic purposes between Sep 2018 to Oct 2018. The ethical approval was not requested since an informed consent was not necessary for the study and we ensured patients data privacy as in the case of other patient test results stored in our laboratory information system. The total analysis duration of each sample was not more than one hour. The samples were analyzed as small batches in different sessions and on different days. After being processing according to routine working instructions , residual samples were then divided into two aliquots. One aliquot was sent to be examined by the manual microscopic method and other was analyzed by the urised 2 automated analyzer. The Urised 2 analyzer requires a urine sample of at least 2ml out of which 200ul is pipette into an individual disposable cuvette without any additional reagents. The filled cuvette is centrifuzed at 2000 RPM for 10 seconds. An automated built in camera then takes 15 images of the settled monolayer of urine particles. Images are recorded and then evaluated by the Auto Image Evaluation Module (AIEM) , the automatic real time , image processing software. Urine particles are classified into the following parameters : RBC , WBC , hyaline casts , pathological casts , epithelial cells , nonsquamous epithelial cells , bacteria , mucous , sperms and crystals which are subclassified into calcium oxalate dehydrate , uric acid or triple phosphate. For the manual method usually 10 – 15 ml is centrifuzed in a test tube at relatively low speed about 1500 to 2000 RPM for 10 minutes until a moderately cohesive button is produced at the bottom of the tube. The supernatant is decanted and a volume of 0.2 to 0.5 ml is left inside the tube. The sediment is resuspended in the remaining supernatant by ficking the bottom of the tube several times. A drop of suspended sediment is poured onto a glass slide and cover slipped. The results were noted and compared which was examined microscopically.

STATISTICS :

In this study if a sample had positivity in both manual and automated microscopy , the automated result was considered as True Positive and if sample was determined as positive in manual and as negative in the automated system , it was deemed False Negative. On the other hand if a sample had negativity in both manual and automated microscopy , the result was considered as True Negative and if a sample was determined as negative in manual and positive in the automated system , it was considered as False Positive. The calculated sensitivity and specificity percentages were considered as evaluation criteria.

Table 1 : Semiquantitative reference values for urine sediment analysis

PARAMETERS	RANGES				
	NEGATIVE			POSITIVE	
		Few	Moderate	High	Many
WBC	0-5	6-10	11-20	21-50	>51
RBC	0-5	6-10	11-20	21-50	>51

RESULT :

In the study conducted sensitivity , specificity , positive predictive value and negative predictive value were calculated separately for RBC and WBC. The sensitivity for RBC was 89.2% , specificity was 93.3% , PPV was 96.8% and NPV was 78.8% respectively. The sensitivity for WBC was 86% , specificity was 91% , PPV was 96% and NPV was 74.3% respectively.

Table 2 : Showing True Positive , False Negative , True Negative and False Positive for WBC and RBC.

	RBC	WBC
True Positive	125	121
False Negative	15	19
True Negative	56	55
False Positive	04	05
TOTAL	200	200

DISCUSSION:

In the present study WBC and RBC manual microscopic examination were compared with the urised 2 automated

analyzer. Some studies have indicated that automated analyzers are superior to manual microscopy for detection of urine formed elements especially in measuring erythrocytes and leukocytes. The automated analyzers take photographs of the morphological structures. Images are very similar to those observed by microscopy and can be easily reviewed . They do not count damaged leukocytes but may count distorted and distrupted cells as artefacts.

CONCLUSION :

Urised Automated analyzers can rapidly analyze a large number of urine samples with high repeatability. However especially in pathological cases confirmation by manual method is recommended because of the limitations of automated analyzers (5,6,7). In addition proper attention to specimen collection and storage is essential to obtain reliable results and to avoid artefacts. The main error prone steps such as centrifugation and manual preparation are omitted in automated analyzers and therefore sample analysis is completed in a very short turn around time. Automated analyzers are indispensable in terms of improved standardization of measurement and more efficient working but the ability of software programs to recognize the urine formed elements accurately needs to be improved. In teaching hospitals this type of automated urine analyzer which takes photographs and stores high definition images is a very good tool for teaching medical students and technologist.

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