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Comparative study between two automated urine strip analyzers: Miditron M and Uriscan Pro+

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Background : *Presently, due to the advancement of technology in laboratory medicine, many automated analyzers have been launched for urinalysis. Urine strip analyzer or urine strip reader is an automated urine analyzer for semi-quantitative analysis of urine biochemistry. The machine has been widely used in health check up. Here, the authors reported a comparative study between two automated urine strip analyzer machines from two different companies used at King Chulalongkorn Memorial Hospital.*

Materials and Methods : *This study was comparative between the two automated urine strip analyzers: Miditron M and Uriscan Pro+. One hundred and ninety-nine individual urine samples were included. For each subject, urine strip tests by both methods were performed.*

Results : *The agreement of glucose, bilirubin, pH and specific gravity determined by both machines were: 100 %, 100 %, 70.8 % and 65.3 %, respectively. A significant correlation was found when Miditron M results of pH and specific gravity were compared with those obtained from Uriscan Pro^{+}.*

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Conclusion : *According to this study, the author found that although the two machines did provide 100 % agreement of glucose and bilirubin results from both machines, and the agreement of pH and specific gravity determined by both machines equals 70.8 % and 65.3 %, respectively, a significant correlation between the two machines was found. The authors hereby concluded that using either urine strip analyzer machine can provide similar analytical results of glucose, bilirubin, pH and specific gravity.*

Keywords : *Urinalysis, Automated, Miditron M, Uriscan Pro+*

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พื้นฐาน : *ปัจจุบันมีความก้าวหน้าเกี่ยวกับเทคโนโลยีเครื่องอัตโนมัติอย่างมากในด้านอายุรกรรมห้องปฏิบัติการ มีการนำเครื่องตรวจวิเคราะห์มาใช้ในการตรวจปัสสาวะ เครื่องตรวจแถบตรวจปัสสาวะเป็นเครื่องอัตโนมัติชนิดหนึ่งสำหรับตรวจวิเคราะห์ปัสสาวะแบบคุณภาพวิเคราะห์ด้านซีวเคมี ได้มีการนำเครื่องดังกล่าวมาใช้อย่างกว้างขวางในงานด้านการตรวจสุขภาพ ในการศึกษานี้ผู้นิพนธ์ได้ทำการศึกษาเปรียบเทียบเครื่องตรวจแถบตรวจปัสสาวะ 2 ชนิดคือ Miditron M และ Uriscan Pro+.*

วัสดุและวิธีการ : *ได้ทำการเปรียบเทียบการวิเคราะห์ด้วยเครื่อง Miditron M และ Uriscan Pro+ โดยใช้ตัวอย่างปัสสาวะจากตัวอย่างส่งตรวจ ที่ส่งตรวจยังหน่วยตรวจปัสสาวะจำนวน 199 ตัวอย่าง*

ผลการศึกษา : *ค่าความสอดคล้องของผลการตรวจวิเคราะห์สำหรับ glucose, bilirubin, pH และ specific gravity จากเครื่องทั้งสองเท่ากับ 100 %, 100 %, 70.8 % และ 65.3 % ตามลำดับ และพบว่า ค่า pH และ ค่า specific gravity ที่ตรวจวิเคราะห์จากเครื่องตรวจแถบตรวจปัสสาวะ Miditron M มีความสัมพันธ์กับเครื่อง Uriscan Pro+*

สรุป : *พบว่าเครื่องทั้งสองให้ผลการตรวจที่สอดคล้องกันสูง 100 % สำหรับการวิเคราะห์ glucose และ bilirubin ดังนั้นการใช้เครื่องตรวจชนิดใดก็ตามย่อมให้ผลการตรวจที่เทียบเคียงกันได้ในกรณีการวิเคราะห์ glucose และ bilirubin และแม้ว่าค่าความสอดคล้องของผลการตรวจวิเคราะห์สำหรับค่า pH และ ค่า specific gravity จะเท่ากับ 70.8 % และ 65.3 % ตามลำดับ แต่ก็มีความสัมพันธ์กัน ดังนั้นการใช้เครื่องตรวจวิเคราะห์แถบทดสอบปัสสาวะชนิดใดก็ตาม ย่อมให้ผลการตรวจที่เทียบเคียงกันได้ในกรณีการตรวจวิเคราะห์ glucose bilirubin pH และ specific gravity*

คำสำคัญ : *การตรวจปัสสาวะ, อัตโนมัติ, Miditron M, Uriscan Pro+*

Urinary analysis (UA) is a basic laboratory investigation in laboratory medicine. It is useful for screening and detection of many diseases.[1,2] In addition, it is recommended for a routine annual check up test.[3] Generally, a routine UA is composed of two parts: microscopic urine sedimentation analysis and urine biochemistry test by urine strip. [1,2]

Presently, due to the advancement of technology in laboratory medicine, many automated analyzers have been launched for urinalysis.[4] Urine strip analyzer or urine strip reader is an automated urine analyzer for semi-quantitative analysis of urine biochemistry. Reagent strip is almost made from cellulose. Reagent areas are coated with chemicals which react with constituents in urine. A change of color depends on the amount of the constituents. The result values are demonstrated in Table 1. There are single and multiple reagent strips for urinalysis. The machine has been widely used in health check-up. Here, the authors reported a comparative study between two automated urine strip analyzer machines from different companies used at King Chulalongkorn Memorial Hospital. Good agreement between both machines can be derived.

Materials and Methods

This study was comparative between two automated urine strip analyzers: Miditron M and Uriscan Pro$^+$. [5,6] Routine urinalysis was analyzed by Miditron M. YD Diagnostics support Uriscan Pro$^+$ to compare with Miditron M. One hundred and ninety-nine individual urine samples were included (Table 2). For each subject, the urine strip tests by both methods were performed.

Table 1. Results from urine strip reader [5,6]

Parameters	Results from urine strip reader
PH	5 5.5 6 6.5 7 8
Glucose	Negative 1+ 2+ 3+ 4+
Specific gravity	1.000 1.005 1.010 1.015 1.020 1.030
Bilirubin	Negative 1+ 2+ 3+ 4+

Table 2. Population classified by sex, age.

Age (year)	Female	Male	Total
Under 11	6	7	13
11-20	9	2	11
21-30	20	8	28
31-40	32	13	45
41-50	21	9	30
51-60	17	8	25
61-70	15	10	25
Over 70	11	11	22
Total	131	68	199

Concerning Miditron M (Roche Diagnostics), the measurement method is reflectance photometer with color image sensor reader head using two main wavelengths at 447 and 620 nm.[7] Concerning Uriscan Pro+ (YD Electronics), the measurement method is reflectance photometer with CCD color image sensor reader head using light wavelength visible rays ranging from 440 to 700nm.[8] All analyses in this study were performed at room temperature according to the machine manufacturers' guidelines under routine laboratory quality control processes.

The parameters used for comparative study in this study included pH, glucose, specific gravity and bilirubin. The correlations between the biochemical parameter results from both analyzers were assessed using percentage of agreement of the results, and interclass correlation co-efficient.

Results

All 199 samples were analyzed by both Miditron M and Uriscan Pro+. Concerning the correlation between both machines, the results are shown in Table 3, Table 4.

Table 3. Correlation between the biochemical parameter results from Miditron M and Uriscan Pro+.

Parameters	Agreement (%)
PH	70.8 %
Glucose	100 %
Specific gravity	65.3 %
Bilirubin	100 %

Table 4. Intraclass correlation coefficient 95 % Confidence Interval pH and specific gravity results from Miditron M and Uriscan Pro+.

Parameters	Intraclass correlation coefficient	95% Confidence Interval		
		Lower Bound	Upper Bound	p-value
PH	0.89	0.85	0.91	<0.001
Specific gravity	0.82	0.76	0.86	<0.001

Discussion

Urine biochemical test is a basic test practiced in laboratory medicine. With advanced automated analyzer technology, many new automated urine strip analyzers have been produced. [4] Based on laboratory medicine principles, it is necessary to evaluate the different machines for analysis of the same test since there might be certain degree of significant discrimination among those machines. Here, the author performed a comparative study on two automated urine strip analyzers. Both analyzers made use of the same reflectance photometer principles with different wavelengths detection.

According to this study, the author found that the two machines did provide 100 % agreement of glucose and bilirubin results from both machines. Although the agreement of pH and specific gravity determined by both machines equals 70.8 % and 65.3 %, respectively, the correlation coefficients between pH, specific gravity using Miditron M and Uriscan Pro$^+$ were 0.89 and 0.82; $p < 0.001$. The authors hereby conclude that the use of either urine strip analyzer machine can provide similar analytical results for only glucose and bilirubin. The interpretation of urine pH and specific gravity should be careful. Confirmation by other standard methods such as spectrometry for urine specific gravity is needed.

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References

1. Free AH, Free HM. Urinalysis , critical discipline of clinical science. CRC Crit Rev Clin Lab Sci 1972 Dec; 3(4): 481-531
2. Brunzel NA. Fundamentals of Urine and body fluid analysis. Pensulvania : W.B. Saunders, 1994.
3. Wiwanitkit V. Abnormal laboratory results as presentation in screening test. Chula Med J 1998 Dec; 42(12): 1059-67
4. King C. Automated methods in urinalysis. Clin Lab Sci 1998 Jan-Feb; 11(1): 44-5
5. Roche Diagnostics Ltd. Coubur 10 test M, reagent strip manual. Bell Lane, BN71LG, Lewes, E. Sussex,GB
6. YD Diagnostics. Uriscan. Reagent strips manual. Seoul, Korea
7. Roche Diagnostics Ltd. Miditron Operator's Manual. Bell Lane, BN7 1LG, Lewes, E. Sussex, GB
8. YD Electronic Co., Ltd. Uriscan Pro Urineanalyzer Operating Manual. Seoul ,Korea