کارگاه های آموزشی مرکز اطلاعات علمی جهاد دانشگاهی

کارگاه آنلاین آشنایی با پایگاه های اطلاعات علمی
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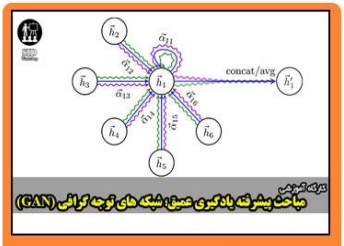

مباحث پیشرفته یادگیری عمیق؛
شبکه های توجه گرافی
(Graph Attention Networks)

کارگاه آنلاین مقاله نویسی IEEE و ISI
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COMPARISON OF URINE CULTURE AND URINE DIPSTICK ANALYSIS IN DIAGNOSIS OF URINARY TRACT INFECTION

P. Ayazi[1]* and M. M. Daneshi[2]

1) Department of Pediatrics Infectious Disease, School of Medicine, Ghazvin University of Medical Sciences, Ghazvin, Iran

2) Department of Microbiology, School of Medicine, Ghazvin University of Medical Sciences, Ghazvin, Iran

Abstract- Urine dipstick is a useful and commonly used test because of its rapidity and low cost; however its diagnostic accuracy is debatable. This research were carried out To determine sensitivity, specificity and positive and negative predictive values of *Nitrite (NIT)* and *Leukocyte Esterase (LE)* testing in relation to urine culture. This research was conducted on 100 hospitalized patients with clinical signs and symptoms compatible with *urinary tract infections (UTI)*. Urine culture and dipstick tests were carried out on urine samples of all patients. Urinalysis LE and *NIT* studies were performed in fresh and uncentrifuged urine by using a manual urine analyzer (rapignost, Co. Marburg, Germany). The urine culture was considered as gold standard. *Urine cultures* were positive in 75 (75%) patients. Dipstick tests of urine were positive in 79(79%) patients. Sensitivity, specificity, positive predictive value *(PPV)* and negative predictive value *(NPV)* of *Dipstick* test were 76%, 12%, 72% and 14% respectively. Although dipstick test of *LE* and *NIT* can avoid a large part of the cost incurred by urine culture, any method of urine screen (*LE* and *NIT*) shouldn't be substituted for a urine culture in the symptomatic patients in childhood.

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Keywords: Dipstick, urine culture, urinary tract infections

INTRODUCTION

Urinary tract infection is a common disease in childhood and approximately 3 to 5 percent of girls, and 1 percent of boys develop a UTI (1,2). In this age group, prompt treatment is essential because UTIs have been considered an important risk factor for the development of renal insufficiency or end stage renal disease(1,2). However prompt treatment depends on rapid diagnosis.

Several rapid screening techniques such as urinalysis (microscopic *Pyuria*), enhanced urinalysis (white blood cell [*WBC*] count per cubic millimeter) plus gram stain, urine dipstick (leukocyte esterase or nitrate) and uriscreen (catalase test) tests have been used in diagnosis of UTI (1).

In this study, urinary culture and two tests within the urinalysis, leukocyte esterase and nitrite were examined in children with signs and symptoms suggesting UTI. We aimed to determine the validity of the urinalysis (nitrite and leukocyte esterase) compared with urine culture.

MATERIALS AND METHODS

The research was conducted on 100 children who were admitted to the department of pediatrics, faculty of medicine, Ghazvin University of Medical Sciences, between April 2003 and April 2004 with symptoms suggesting UTI.

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*** Corresponding Author:**
Parviz Ayazi, Department of Pediatrics Infectious Disease, School of Medicine, Ghazvin University of Medical Sciences, Ghazvin, Iran
Tel: +98 912 1823797
Fax: +98 281 3344088
E-mail: parviz_ayazi@yahoo.com

Inclusion criteria were: for infant, fever with no apparent source, vomiting, decreased appetite and irritability; for toddlers, abdominal pain and voiding frequency with or without fever; and for older children, *dysuria*, *Frequency*, *Urgency*, and abdominal or flank pain with or without fever. **Children** receiving antibiotic therapy were excluded from the study. In all children, physical examination was performed, and two tests within the urinalysis (NIT and LE) and urine culture were examined. Complete blood count, *Erythrocyte sedimentation rate* and *C-reactive protein* were also analyzed. The children diagnosed as UTI were treated with appropriate antibiotic to the result of antibiogram.

In infants, the application of an adhesive, sealed, sterile collecting bag after disinfecting of the skin of the genitals was used for obtaining urine. In toilet-trained children, a midstream urine sample was taken (2). Urinalysis LE and NIT studies were performed in fresh and uncentrifuged urine by using a manual urine analyzer (rapignost, dad-behaving company, marburg, Germany). Microscopy for bacteria and pyuria was performed on a centrifuged urine specimen in all children. Within manual urinalysis, NIT and LE were considered positive if a change in dipstick color was apparent within 30 to 60 seconds. The urinalysis was considered positive if either LE or NIT were positive. Quantitative urine culture was performed, using a loop calibrated to deliver 0.01 ml to inoculate sheep blood agar and eosine methylen blue agar culture plates. All plates were incubated at 35°c and read at 24 and 48 hours for bacterial identification and colony count. Diagnosis of bacterial species were based on direct smear, biochemical reaction and selective media. (*TSI, citrate, urea, SIM, MR, and VP agar*).

Cultures were considered positive if the culture showed greater than 100,000 colonies of a single pathogen (2). The results were analyses for urine dipstick (LE and NIT). With a positive urine culture of more than 100,000 pure growth organisms per milliliter as the validating standard, sensitivity, specificity, and positive and negative predictive values were calculated for urine dipstick (LE and NIT). Statistical analysis was performed by using – square test (p value of less than 0.005 was considered statically significant).

RESULTS

A total of 100 children, aged 15 days to 11 years, were included in the study: 83 girls (83 percent) and 17 boys (17 percent). Of these children, 75 (75 percent) had a positive urine culture, 62 girls (62 percent) and 13 boys (13 percent).

There is a significant difference between the age groups and gender ($p<0.005$) (Table 1).

Of the cultures, 57 (76 percent) were Positive for *Escherichia coli*, 5(6.7 percent) For *Proteus mirabilis*, 5 (**6.7** percent) For *Enterococci*, 4 (5.2 percent) For *Klebsiella pneumonia*, 3 (4 percent) for ***Coagulase*** *negative staphylococci* and 1 1.4 percent) For *Pseudomonas aeruginosa* (Table 2).

Table1. Data of the children with positive cultures according to the age and gender.

Age groups	Male n(%)	Female n(%)	Total n(%)
0 to 2 months	2 (15)	0 (0)	2 (3)
2 months to 2 years	9 (70)	37 (60)	46 (61)
2 years to 12 years	2 (15)	25 (40)	27 (36)
Total	13 (100)	62 (100)	75 (100)

Table 2. Distribution of patients according to the bacteria isolated from urine cultures.

Bacteria isolated from urine cultures	Male n(%)	Female n(%)	Total n(%)
Escherichia coli	9 (64.3)	48 (79)	57 (76)
Enterococci	0 (0)	5 (8)	5 (6.7)
Proteus mirabilis	4 (28.5)	1 (1.5)	5 (6.7)
Klebsiella Pneumonia	0 (0)	4 (6.5)	4 (5.2)
Staphylococci (coagulase negative)	0 (0)	3 (5)	3 (4)
Pseudomonas Aeruginosa	1 (7.2)	0 (0)	1 (1.4)
Total	14 (100)	61 (100)	75 (100)

Table 3. Sensitivity, specificity and positive predictive values for urinary dipstick (either L.E. or NIT positive).

	Positive culture	Negative culture	Total
Positive test	57	22	79
Negative test	18	3	21
total	75	25	100

Sensitivity, 76%, specificity, 12%,
Positive predictive value, 72%,
Negative predictive value, 14%.

DISCUSSION

Although a number of studies have evaluated the use of urinary dipstick (L.E. and N.I.T) in infant and children, the result obtained from the investigation are fairly different (1,2-16). A study by Arsalan et al of 100 children found the overall urinalysis (L.E. NIT and…) to have a sensitivity of 74% and specificity of 3.5% (1). A review by Gorelick showed that sensitivity and specificity of dipstick (either L.E. or NIT positive) were 88% and 93% respectively. But sensitivity and specificity of NIT (only) and L.E. (only) were 50%, 98%, 83%, and 84% respectively (4).

Another study by Hiraoka et al of 92 children found the combined tests (L.E. and NIT) to have a sensitivity and negative predictive value of 100%. These results suggest that use of the dipstick test of L.E. and NIT can avoid a large part of the cost incurred by urine culture and is useful for screening UTI in children (6).

In conclusion, our findings revealed that a combination of L.E. and NIT showed the sensitivity (76%) and specificity (12%) Table 3). To these finding (which is compatible with study by Arsalan[1]) we suggest that any method of urine screen (L.E. or NIT) shouldn't be substituted for a urine culture in the symptomatic patients in chidhood.

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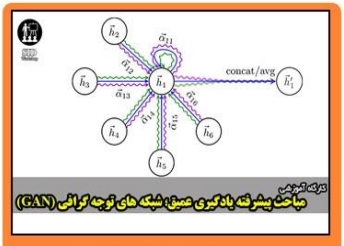

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