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Original Article

Assessment of utility of screening tests in urinary tract infections

Neelima Mittal

Assistant Professor, Department of Microbiology, SIMS, Hapur, U.P., India

ABSTRACT:
Background: Urinary tract infections (UTI) are the most common outpatient infections, but predicting the probability of UTI through symptoms and test results can be complex. The present study was conducted to assess utility of screening tests in urinary tract infections (UTI). **Materials & Methods:** 85 patients of urinary tract infections (UTI) of both genders was recorded. All urine samples received at Microbiology laboratory was subjected to Gram staining, leucocyte esterase and nitrite dip stick test along with culture. Results of these tests were compared to culture results. Sensitivity and specificity of the tests was determined taking culture as standard. **Results:** Out of 85 patients, males were 35 and females were 50. Urine microscopy (gram stain) showed culture positive16 and culture negative, leucocyte esterase test showed culture positive13 and culture negative 32 and Nitrite test showed culture positive14 and culture negative 36. The difference was significant (P< 0.05). The sensitivity (%) and specificity (%) of urine microscopy (Gram's staining) was 72% and 96%, leucocyte esterase test was 75% and 70% and nitrite test was 80% and 96% respectively. **Conclusion:** Urine microscopy by Gram's staining, leucocyte esterase and nitrite dipstick test in combination can be used routinely to exclude bacteriuria.
Key words: Gram's staining, Leucocyte esterase, Nitrite dipstick test

Corresponding author: Neelima Mittal, Assistant Professor, Department of Microbiology, SIMS, Hapur, U.P., India

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INTRODUCTION:

Urinary tract infections (UTI) are the most common outpatient infections, but predicting the probability of UTI through symptoms and test results can be complex. The most diagnostic symptoms of UTI include change in frequency, dysuria, urgency, and presence or absence of vaginal discharge, but UTIs may present differently in older women.[1] Dipstick urinalysis is popular for its availability and usefulness, but results must be interpreted in context of the patient's pretest probability based on symptoms and characteristics. In patients with a high probability of UTI based on symptoms, negative dipstick urinalysis does not rule out UTI. Nitrites are likely more sensitive and specific than other dipstick components for UTI, particularly in the elderly.[2]

Even though there are various methods for screening, urine culture is considered as the gold standard test for detecting bacteriuria. However, culture is expensive and takes 24-48 hours to obtain results.[3] To overcome these problems, many alternative screening methods have been evaluated, including urine microscopy, chemical analysis using a dipstick method, Gram staining, dipslide urine culture and bioluminescence.[4] Each method has advantages and disadvantages in terms of sensitivity, specificity, adaptability, capital investment, running costs, automation and convenience for its use. Dipstick test, where detection of leucocyte esterase and nitrite is employed, is one of the qualitative diagnostic methods used to detect UTI and have the advantage of being easy to perform, interpret, can be carried out in primary care giving facilities and result can be obtained immediately.[5]The present study was conducted to assess utility of screening tests in urinary tract infections (UTI).

MATERIALS & METHODS:

The present study comprised of 85 patients of urinary tract infections (UTI) of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. All urine samples received at Microbiology laboratory was subjected to Gram staining, leucocyte esterase and nitrite dip stick test along with culture. Results of these tests were compared to culture results. Sensitivity and specificity of the tests was determined taking culture as standard. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS:

Table I Distribution of patients

Total- 85		
Gender	**Males**	**Females**
Number	35	50

Table I shows that out of 85 patients, males were 35 and females were 50.

Table II Screening test

Parameters	Variables	Culture positive	Culture negative	Total
Urine microscopy (gram stain)	Positive	16	35	51
	Negative	14	20	34
	Total	30	55	85
Leucocyte esterase test	Positive	13	32	45
	Negative	17	23	40
	Total	30	55	85
Nitrite test	Positive	14	36	50
	Negative	16	19	35
	Total	30	55	85

Table II, graph I shows that urine microscopy (gram stain) showed culture positive16 and culture negative, leucocyte esterase test showed culture positive13 and culture negative 32 and Nitrite test showed culture positive14 and culture negative 36. The difference was significant (P< 0.05).

Graph I Screening test

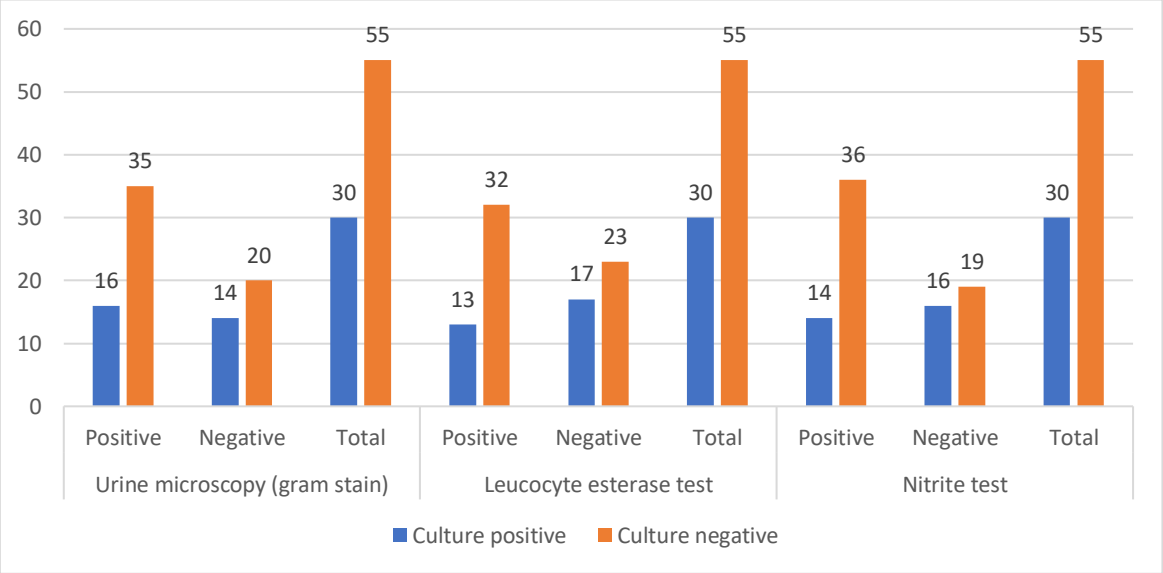

Table III Efficacy of screening tests

Tests	Sensitivity (%)	Specificity (%)
Urine microscopy (Gram'sstaining)	72%	96%
Leucocyte esterase test	75%	70%
Nitrite test	80%	96%

Table III shows sensitivity (%) and specificity (%) of urine microscopy (Gram's staining) was 72% and 96%, leucocyte esterase test was 75% and 70% and nitrite test was 80% and 96% respectively.

DISCUSSION

Positive dipstick testing is likely specific for asymptomatic bacteriuria in pregnancy, but urine culture is still the test of choice.[6] Microscopic urinalysis is likely comparable to dipstick urinalysis as a screening test. Bacteriuria is more specific and sensitive than pyuria for detecting UTI, even in older women and during pregnancy.[7] Pyuria is commonly found in the absence of infection, particularly in older adults with lower urinary tract symptoms such as incontinence. Positive testing may increase the probability of UTI, but initiation of treatment should take into account risk of UTI based on symptoms as well. In cases in which the probability of UTI is moderate or unclear, urine culture should be performed.[8] Urine culture is the gold standard for detection of UTI. However, asymptomatic bacteriuria is common, particularly in older women, and should not be treated with antibiotics. Conversely, in symptomatic women, even growth as low as 10^2CFU/ml could reflect infection.[9]The present study was conducted to assess utility of screening tests in urinary tract infections (UTI).

We found that out of 85 patients, males were 35 and females were 50. Jayalakshmi et al[10]evaluatedgram staining of urine, leucocyte esterase and nitrite dipstick test methods in the rapid diagnosis of urinary tract infections. A total of 560 urine samples were processed. Culture showed significant bacteriuria in 210 cases. The sensitivity of urine microscopy was 70.9%, leucocyte esterase test was 98% and nitrite test was 74.8%. Whereas the specificity of urine

microscopy was 70%, leucocyte esterase test was 79.1% and nitrite test was 98.8%. Similarly, the sensitivity of combined leucocyte esterase and nitrite tests was 90.9% and specificity was 97.4%. Sensitivity and specificity of all the three screening tests combined were 95.7% and 94.8% respectively.

We observed that urine microscopy (gram stain) showed culture positive16 and culture negative, leucocyte esterase test showed culture positive13 and culture negative 32 and Nitrite test showed culture positive14 and culture negative 36. Nayak et al[11]assessed the diagnostic value of dipstick and microscopy of urine in the diagnosis of UTI in comparison with culture.Children aged between 3 months-15 years of age, in whom UTI was suspected clinically were included in the study. Dipstick and microscopic examination of urine were done and compared with the urine culture. Total of 104 children with clinical suspicion of UTI were evaluated in the study. The specificity of nitrite is 93.94%, leucocyte esterase 75.76%, urine dipstick test (nitrite and leukocyte esterase) 96.97% and urine microscopy is 50% when compared to urine culture.Urine dipstick test (nitrite and leukocyte esterase) and urine microscopy can be used as screening tests to rule out or rule in UTI. This would be useful clinically as treatment could be commenced in children pending culture reports.

We found that sensitivity (%) and specificity (%) of urine microscopy (Gram's staining) was 72% and 96%, leucocyte esterase test was 75% and 70% and nitrite test was 80% and 96% respectively. Carias et al[12] in their studies found that the sensitivity of nitrite was high.Leukocyte esterase tests are based on the hydrolysis of ester substrates by proteins with esterolytic activity. Human neutrophils produce as many as 10 proteins with esterolytic activity.[13] These proteins react with ester substrates to produce alcohols and acids that then react with other chemicals to produce a colour change that is proportional to the amount of esterase in the specimen. A reagent strip impregnated with buffered in doxyl carboxylic acid ester and diazonium salt is used to detect leucocyte esterase. These tests have the advantage of detecting both esterases in intact leukocytes and esterases released after cell lysis. Therefore, even specimens that have not been preserved properly may yield a positive test result. False positive result may also be obtained from high levels of ascorbic acid and albumin in urine.[14]

CONCLUSION

Authors found that urine microscopy by Gram's staining, leucocyte esterase and nitrite dipstick test in combination can be used routinely to exclude bacteriuria.

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