



COMPARATIVE STUDY OF SCREENING TECHNIQUES FOR EARLY DETECTION OF URINARY TRACT INFECTIONS: A DIAGNOSTIC PERSPECTIVE

Microbiology

Samira B. Inamdar Department of Microbiology, D.Y.Patil Medical College, Kolhapur.

Dr. R. S. Mohite Department of Microbiology, Bharati Vidyapeeth Medical College, Sangli.

ABSTRACT

Introduction: Urinary tract infection (UTI) is a prevalent condition affecting all age groups and genders, caused by microbial growth in the urinary tract. Various rapid screening tests such as dipstick tests for leukocyte esterase (LE) and nitrites, catalase assay, wet mount, and Gram staining - aid in preliminary diagnosis. **Methods:** A total of 404 urine samples from suspected UTI cases were analyzed from January to November 2021 at Bharati Vidyapeeth (Deemed to be University) Medical College and Hospital, Sangli. Multiple screening methods were employed on each sample. **Results:** Pus cells were observed in 104 samples (wet mount), organisms in 219 (Gram stain), catalase positivity in 116, nitrite in 96, LE in 112, and dip slide culture was positive in 138 samples. **Conclusion:** Uncentrifuged Gram staining proved to be the most sensitive screening method. It is recommended as a routine preliminary test before culture due to its diagnostic value.

KEYWORDS

Urinary Tract Infection (UTI), Leukocyte Esterase, Uropathogens

INTRODUCTION:

Urinary tract infection (UTI) is a widespread illness that occurs with aging, which includes babies and the elderly. [1] UTIs are caused by the multiplication of microbes in the urinary system. [2] The primary signs of UTIs are bacteriuria and pyuria. [3] UTI can be caused by Gram positive bacteria such as *Enterococcus species*, *Streptococci*, *Staphylococcus saprophyticus*, and Gram negative bacteria like *Escherichia coli*, *Citrobacter species*, *Klebsiella species*, *Enterobacter species*, *Proteus species*, and *Pseudomonas species*. *Escherichia coli* is the most frequent organism causing both hospital acquired as well as community acquired [4] The incidence of UTIs varies depending on the sufferer's age and sex. Predisposing factors such as poor bladder emptying from uterine prolapse in women, obstructive uropathy from the prostate in men, and operations that need instrumentation in both women and men, can be expected to have greater rates of occurrence in the elder age. Proper recognition of UTI is necessary to ensure rapid and precise treatment of patients. [3] Multiple rapid screening assays, including dipstick biochemical urine analysis for LE i.e., leukocyte esterase or nitrites, catalase assay, automated assays, glucose oxidase assay, and microscopic analysis of urine sample for white blood cells by wet mount or bacteria by Gram stain, are widely used to create a preliminary detection of UTIs. [5]

MATERIALS AND METHODS

The study was conducted from January to November 2021 in the Microbiology Department of Bharati Vidyapeeth (Deemed to be University) Medical College, Sangli, using 404 urine samples from clinically suspected UTI cases.

Inclusion Criteria:

All urine samples in sterile urine culture bottle are included in the study.

Exclusion Criteria:

Urine samples in unsterile containers are excluded from the study.

The urine specimens were gathered in a clean, moist container and analyzed fresh. Sterilized containers were used for culturing. [6] Urine specimens of approximately twenty milliliters were gathered by using a clean-catch midstream or catheter-catch approach and placed in a sterile container [2, 7]. Urine must be taken from the catheter rather than the collection bag. The catheter must not interact with the container. [8] Suprapubic aspiration is nearly entirely designated for new-borns and young kids. [9] For every specimen, details like the patient's name, address, gender, age, and the date of specimen collection were documented. Various screening tests (Wet mount examination, Gram stain, catalase test, dip-stick test) were performed.

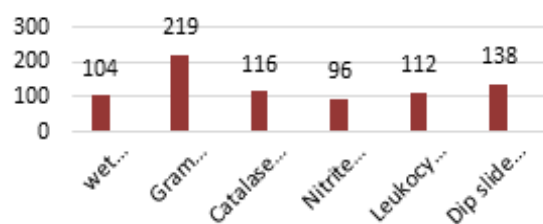
RESULTS:

404 patients with suspected urinary tract infection were enrolled in the study, among these pus cells were seen in 104 samples on wet mount examination, organisms were observed in 219 samples on Gram staining, whereas 116 were catalase positive, 96 samples give nitrite test positive and 112 samples shows leukocyte esterase test positive

and the dip slide culture give positive result for 138 samples.



Graph - Screening Tests wise distribution



DISCUSSION:

This study evaluated six rapid and accessible tests for UTI diagnosis. Wet mount examination showed pyuria in 25.74% of samples, lower than findings in previous studies. Gram staining had a 54.20% positivity rate, supporting its value in guiding empirical treatment, though it is time-consuming. The nitrite test showed 23.76% positivity, consistent with other studies, but is limited to detecting nitrite-producing Gram-negative bacteria. The leukocyte esterase test had a 27.72% positivity rate, lower than reported by others, but remains useful due to its rapid detection of esterolytic activity. Dip slide culture showed growth in 34.15% of samples, slightly lower than comparative studies, but remains a practical tool for routine screening due to its simplicity and minimal processing time.

CONCLUSION:

In comparison to other screening tests, uncentrifuged Gram staining has been shown to be highly sensitive and useful screening test. So, it is concluded that Gram staining should be performed with all urine samples before culture as it gives valuable information about infection.

REFERENCES:

- 1) Pritam Pardeshi, Prevalence of urinary tract infections and current scenario of antibiotic

- susceptibility pattern of bacteria causing UTI. Indian Journal of Microbiology Research, July-september, 2018;5(3):334-338.
- 2) Apurba S Sastry, Sandhya Bhat. Essentials of MEDICAL MICROBIOLOGY 2nd edition, jaypee brothers medical publishers. 2019.
 - 3) R Parveen, SK Saha, SM Shamsuzzaman, AL Rashid, A Chowdhury, N Muazzam. Detection of uropathogens by using Chromogenic Media (HiCrome UTI agar), CLED agar and other Conventional media. Faridpur Med. Coll. J. 2011;6(1):46-50.
 - 4) Abdelraoul A. Elmanama, Anfal A. Alregeb, Heba Kamal Kalloub, Mariam R. Al-Reefi, Rami J. Musallam, Samah A. Radi, Zyed M. Harara. Bacterial etiology of urinary tract infection and their antimicrobial resistance profiles. Journal of Al Azhar University- Gaza (natural sciences), 2018, 20(2):81-98.
 - 5) Ananthnarayan and paniker's. Textbook of microbiology, 9th edition, universities press (India) private limited. 2013.
 - 6) Krzysztof Czajkowski, Magdalena Bros-Konopielko, Justyna Teliga-Czajkowska Urinary tract infection in women Menopause Rev 2021; 20(1):40-47 (2021)
 - 7) Akeela Fatima, Abiroo jan, Nighat Akhter, Bashir A, Fomda, Mohd Suhail Lone, Junaid ahmed, Lubna samad, shugufta roohi. Evaluation of microscopic screening methods for detection on urinary tract infection. Int J Cur Res Rev| vol 9. Issue 6. March 2017.
 - 8) Bijji, S Manjusree, O. Sasikumari and Ramani Bai, J.T. 2017. A study on Evaluation of different culture media for the isolation of routine urinary pathogens. Int. j. curr. Microbio. App. Sci. (6):195201. doi: <http://dx.doi.org/10.20546/ijcmas.2017.602026>.
 - 9) Issac Dadzie, Elvis Quansah, Mavis Puopelle Dakorah, Victoria Abiade, Ebenezer Takyi-Amuah, and Richmond Adusei. The effectiveness of Dipstick for the detection of Urinary tract infection. Canadian journal of infectious diseases and medical microbiology 2019.