

ORIGINAL RESEARCH

Physicochemical Alteration In Urine Of Patients With Urinary Tract Infection: A Hospital-Based Cross-Sectional Study

¹Dr. Somendra K Dhariwal, ²Dr. Abhiraj Ramchandani, ³Dr. Shivank Shrivastava, ⁴Dr. Khyati Jain

¹Associate professor, Department of Pathology, People's College of Medical Sciences and Research Center, Bhopal, MP.

²Associate professor, Department of Pathology, Amaltas institute of medical sciences, Dewas, MP.

³Assistant professor, Department of Medicine, LNCT Medical College and Sewakunj Hospital, Indore, MP.

⁴ Professor, Department of Microbiology, People's College of Medical Sciences and Research Center, Bhopal, MP.

Corresponding Author

Dr. Khyati Jain

Professor, Department of Microbiology, People's College of Medical Sciences and Research Center, Bhopal, MP

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Abstract

Introduction: Urine routine examination is of great value in diagnosing various disorders in symptomatic as well as asymptomatic patients.

Aim: This study was carried out in a tertiary care hospital, Indore, M.P. with the aim of screening urinary tract infections using dipstick test and Gram stain.

Methods: A dipstick test and Gram staining were used to examine the urine of a clinically suspected patient of urinary tract infections.

Results: Gram stain was able to detect 96.7% of urinary tract infections and urine dipstick test can strongly indicate urinary tract infections in 91% (leucocytes- 99.9% and nitrite test- 91% positive)

Conclusion: It can be concluded from the present study that the physical appearance, and presence of protein, glucose, pus, and bacteria in Gram stain can serve as indicators of urinary tract infections.

Keywords: Dipstick urine test, physicochemical properties, screening test, Gram staining

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Introduction

Urinary tract infections are a common health problem faced in OPD, IPD, and nosocomial infections.¹ Urine specimens, as no surprise accounts for a major part of the workload in almost all hospital-based pathology laboratories. There are various other tests that aid in the diagnosis of urinary tract infections like urine microscopy, leukocyte esterase test, nitrite test, and urine dipstick test.² Prompt diagnosis and treatment can reduce the morbidity and complications associated with urinary tract infections. A gold standard test to diagnose urinary tract infections is urine culture, which is time-consuming, costly, and not available at all healthcare facilities.^{3,4,5} This study is done to evaluate urine dipstick test and Gram stain of urine as a tool for detecting urinary tract infections.

Method

The study was carried out in the Pathology department, LNCT Medical College and Sewakunj Hospital, Indore. It was cross cross-sectional study done for a period of six months from 01 March 2022 to 31 August 2022. Study population: 1000 clinically suspected (patients complaining of frequency, urgency, burning micturition, and fever) and urine culture-positive patients were included in the study. Culture-negative samples and individuals already on treatment were excluded from the study. Sample: mid-stream, clean catch method for urine collection was used. Urine dipstick test: uriscan (YD Diagnostics) urine dipstick was used. In this study, among different parameters detected in the urine dipstick test, the presence of leucocytes and positive urine nitrite test was considered

a strong indicator of urinary tract infection. Gram stain: centrifuged urine was used for making gram stain

Results

Out of a total of 1000 clinically suspected and culture-positive patients, 555(55.5%) were male and

445(44.5%) were female. The age group of patients included was from 17 years to 66 years. Most patients were in the age group of 30 -40 years. Out of 1000 urine specimens 650 (65%) were from medicine OPD, 255(25.5%) from medicine IPD and 95 (9.5%) were from MICU.

Table 1: Results Of Physical Examination

S.No	Gross Appearance	Number Of Samples Giving Positive Results
1	CLEAR	75
2	TURBID	800
3	HAZY	73
4	CLOUDY	52

Table 2: Results Of Dipstick Test

S.No	Parameter	Number Of Samples Giving Positive Results
1	PROTEIN	96%
2	GLUCOSE	4%
3	LEUCOCYTE	99.9%
4	RBC	4%
5	NITRITE	91%

Table 3: Results Of Gram Staining

S.No	Gram Negative Bacilli	Gram-Positive Cocci	Yeast Cells	No Organisms
1	813	82	72	33

Discussion

Early detection and treatment are necessary to prevent serious diseases from getting complicated. Urine dipstick tests along with routine Gram staining of urine samples can provide a strong indication of urinary tract infections and can even help in starting empirical treatment of patients according to staining results.^{6,7,8} In this study, urinary tract infections were seen in a high percentage among males as compared to females which is similar to studies done by Wennerstrom et. Al. and Tambyah and Maki et al.^{9,10} The results obtained from physical examination of urine from urinary tract infection patients revealed majority of the samples looked turbid. Variation may be due to the presence of pus cells, RBC, epithelial cells, etc. in urine. Gram staining showed majority of urinary tract infections were from Gram Negative Bacilli which is in accordance with previous studies.¹⁰ In the urine dipstick test majority of the patients were positive for protein, leucocyte, and nitrite test, which is similar to previous studies done.¹¹ The reason could be the presence of microorganisms and the inflammation produced by them. In this study accuracy of the Gram stain was 96.7% and the urine dipstick test positive for both leucocytes and nitrite test was 91%. Thus, better results were obtained for Gram stain than urine dipstick test, which is similar to the observation of Lockhart GR et al, Fernandez BJ et al and Arslan S et al.^{6,12,13}

Conclusion

In the current study, results of Gram staining which was positive in 96.7% of cases, and urine dipstick test positive for nitrite and leucocytes can serve as good indicators for prompt treatment of urinary tract infections. Although urine culture is the gold standard test and should be done better strategies should be adopted to minimize the time and cost for initial screening and start of empirical therapy.

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