Original Article

Prevalence of Urinary Tract Infections (UTIs) Among School Going Children in Dhaka, Bangladesh: A Dipstick Test Study

ANM Saiful Hasan[1], Mahmuda Hassan[2], Md. Anwar Hossain Khan[3], Shahnaz Akhtar[4], ABM Mahbub Ul Alam[5], M Saiful Bahar Khan[6], Kabir Alom[7], Md. Abu Sayed Miah[8], Tasneema Juaira.[9]

Abstract

Few studies have evaluated dipstick urinalysis for children. It is an easy, quick and reliable test for predicting urinary tract infection (UTI) within a short period of time. The aim of this study was to evaluate urinary tract infection among school going children who were completely unaware about their urinary tract infection through dipstick urinalysis. It is a cross-sectional study. In this study urine specimens were collected from 2239 school children from six different schools of different places in Dhaka city and its downtown. Dipstick urinalysis for nitrite and leukocyte were performed for this study. Sensitivity, specificity, positive and negative predictive values with 95% confidence intervals were calculated. Visual readings were compared to readings with a urine chemistry analyzer. There were 5.95% children who had only leukocytes present in urine, among them 6.50% boys and 5.21% girls. When investigating for UTI in children at schools, we suggest nitrite and leukocyte esterase dipstick be combined. There are no clinically relevant differences between visual and analyzer dipstick readings.

Key words: Dipstick. Infection, Leukocytes, Nitrites.

Introduction

Dipstick urinalysis is often the first measure for detecting bacteriuria.[1] The diagnostic value of dipstick urinalysis is most often evaluated for children and working age adults, preferably women which may lead to different results depending on age group and patient criteria. Thus, the clinical value of dipstick urinalysis could be quite different for elderly patients at nursing homes compared to younger patients whereby elderly patients have a higher prevalence of bacteriuria.[2,3,4]

Dipsticks using nitrates and leukocyte esterase have become available as markers of urinary tract infection (UTI) now a days. Leukocyte esterase is an enzyme from neutrophils not normally found in urine and is a marker of pyuria. Nitrates are produced by the bacterial breakdown of dietary nitrates. Most urinary pathogens reduce nitrates to nitrites.[5] Dipsticks use as a routine screening test for UTIs both in children and adults. In children, the method of urine collection is often variable, and UTIs have far reaching implications.[6]

A positive urine culture may confirm the diagnosis and is considered the gold standard in scientific studies. Moreover, susceptibility testing may be performed on cultured bacteria and may guide antibiotic therapy. Considering these facts, it is no surprise that urine samples are the most frequently received specimens in many microbiology laboratories. Nevertheless, a high number of these urine cultures will not yield any bacteria at all, and percentages for negative urine cultures up to 80% have been reported.[7,8] In Dipstick test, where only nitrites and leukocyte esterase - and not proteins and

1. Sr. Sc Officer, Sir Salimullah Med College Mitford Hospital, Dhaka, Bangladesh.
2. Prof., Dept. Paed, Ad-din Women's Medical College, Dhaka, Bangladesh.
3. Prof. & Head, Dept.of Paed Nephrol, Nat Inst Kidney Dis & Urol, Dhaka
4. Asst. Prof., Dept. OBGYN, Ad-din Women's Medical College, Dhaka, Bangladesh.
5. Assoc. Prof., Dept. of Paed Nephrol, Nat Inst Kidney Dis & Urol, Dhaka, Bangladesh.
6. Head, Dept. of Nephrology,Ad-din Women's Medical College & Hospital, Dhaka.
7. Assist Prof, Dept. of Paed Nephrol, Nat Inst Kidney Dis & Urol, Dhaka, Bangladesh.
8. Sr. Clin Pathol, Sir SSMCH, Dhaka.
9. Assoc. Prof. Dept. Of Physio, Munno Medical college, Manikganj.

Correspondence: ANM Saiful Hasan, Sr. Sc Officer, Sir Salimullah Med College Mitford Hospital, Dhaka, Bangladesh. Email: drsaifulpdn@gmail.com. Mobile: 01720212987

Received Date : 10 October, 2020

Accepted Date : 20 December 2020

blood – show fair accuracy, compared with a quantitative culture.[9]

This dipstick test has a limited use in screening for asymptomatic bacteriuria. The leukocytes test component of the dipstick test appears to have the highest reliability and validity. A positive test merits empirical antibiotics, while a negative test is an indication for urine culture. The urine dipstick test if positive will also be useful in follow-up of patient after treatment of urinary tract infection. This is useful in a developing country like Bangladesh, where people are very much unaware about their diseases as well as their children's diseases.

Material and Methods:

It is a cross sectional study. The demographics of the Dhaka and its downtown are composed of children representing the entire population who are studying in various schools. The total number of children included our study was 2239 carried out between April 2012 and February 2018. Permission and consent was taken from the school authorities as well as parents of students. The students and their parents were instructed how to obtain a clean mid-stream urine specimen. Age of the students were between 06 to 16 years.

In this study, we use dipstick (urine quick test; Combur-10-Test™, Roche, Mannheim, Germany). for biochemical analysis which consists of 10 reagents: pH, specific gravity, protein, RBC, glucose, leukocytes, nitrites, urobilinogen, bilirubin and ketones. We considered nitrites and leukocytes for our study. Each strip reacts with the substance present in urine and quickly changes color (60-120 seconds). The color of the strip was compared to the color chart present in the dipstick container.

Statistical analysis was done by using statistical package of social science SPSS version 16. Qualitative data were expressed in the form of numbers and percentages. Differences between groups were evaluated by chi-square test. Fisher's exact test was used for small samples.

Results:

Table I: Leukocytes (>5/hpf) present in urine.

Total	Number	percentage
Boys (1343)	87	6.50
Girls (896)	45	5.11
Total- 2239	132	5.95

Table I shows boys have more in percentage of leukocytes in urine. There were 132 children (5.95%) who had only leukocytes present in urine , among them 87(6.50%) boys and 45(5.11%) girls.

Table II: Nitrites present in urine.

Total	Number	percentage
Boys (1343)	60	4.46
Girls (896)	23	2.65
Total- 2239	83	3.73

Table II shows presence of Nitrites in urine was more in boys than girls. Total 83 children (3.73%) had presence of nitrites in urine, among them 60(4.46%) boys and 23 (3.73%) girls.

Discussion:

UTI is a common cause of fever in young children, often accompanied by subtle and non-specific clinical findings [10]. In a small percentage of children this may lead to kidney scarring, and at a later age to hypertension, and even renal failure [11].

The leucocyte-esterase test had a much higher accuracy in urology patients, consequently also in tertiary care, and when using a catheter for urine-collection. Sensitivity is highest in primary care, but requires further diagnostic work-up because of the high rates of false positives. In primary care negative results do not exclude the presence of infection.

Here, boys have more in percentage of leukocytes (>5/hpf) in urine. There were 132 children who had only leukocytes(>5/hpf) present in urine, among them 87 (6.50%) boys and 45 (5.11%) girls.

The accuracy of the dipstick for nitrites was affected only by the cut-off point for the nitrites and the population tested. The differences between the studies with regard to implicit cut-off points may be effected by human, instrumental or environmental factors. Patient populations and care setting were highly correlated. Pre-test probabilities differed between some levels of care. While it is often expected that pre-test probability increases with each level of the health care system, the test for nitrites might perform better in asymptomatic patients and in patients who are not on antibiotics. [12].

In our study we found presence of Nitrites in urine were more in boys than girls. Total 83 children (3.73%) had presence of nitrites in urine, among them 60 (4.46%) boys and 23 (3.73%) girls. Children who had leukocytes in urine had nitrites in urine, in other words who had nitrites in urine also had leukocytes.

Conclusion:

Overall, this study demonstrates that the urine dipstick test alone seems to be useful in all populations to exclude the presence of infection if the results for nitrites or leukocyte-esterase are negative. But positive test results have to be confirmed to be high on the basis of the clinical history or a combination of other tests. In family practice, the combination of both tests with at least one positive result is very important.

References :

1. Juthani-Mehta M, Drickamer MA, Towle V, Zhang Y, Tinetti ME, Quagliarello VJ. Nursing home practitioner survey of diagnostic criteria for urinary tract infections. J Am Geriatr Soc. 2005;53: 1986–1990.
2. Nicolle LE. Urinary tract infections in long-term-care facilities. Infect Control Hosp Epidemiol. 2001;22: 167–175.
3. Hedin K, Petersson C, Widebäck K, Kahlmeter G, Mölstad S. Asymptomatic bacteriuria in a population of elderly in municipal institutional care. Scand J Prim Health Care. 2002;20:166–168.
4. Nicolle LE, Henderson E, Bjornson J, McIntyre M, Harding GK, MacDonell JA. The association of bacteriuria with resident characteristics and survival in elderly institutionalized men. Ann Intern Med. 1987;106:682–686.
5. Fowlis GA, Waters J, Williams G. The cost eVectiveness of combined rapid tests (Multistix) in screening for urinary tract infections. J R Soc Med 1994;87:681–2.
6. Woodward MN, GriYths DM. Use of dipsticks for routine analysis of urine from children with acute abdominal pain. BMJ 1993;306:1512.
7. 5. Brilha S., Proenca H., Cristino J. M., Hanscheid T. 2010. Use of flow cytometry (Sysmex UF-100) to screen for positive urine cultures: in search for the ideal cut-off. Clin. Chem. Lab. Med. 48:289–292.
8. 6. Okada H., et al. 2000. Detection of significant bacteriuria by automated urinalysis using flow cytometry. J. Clin. Microbiol. 38:2870–2872.
9. Lohr JA. Use of routine urinalysis in making a presumptive diagnosis of urinary tract infection in children. Pediatr Infect Dis J. 1991;10:646–50.
10. Gorelick MH, Shaw KN. Screening tests for urinary tract infection in children: A meta-analysis. Pediatrics. 1999;104:e54.
11. Brooks D. The management of suspected urinary tact infection in general practice. Br J Gen Pract. 1990;40:399–402.
12. Beer JH, Vogt A, Neftel K, Cottagnoud P. False positive results for leucocytes in urine dipstick test with common antibiotics. BMJ. 1996;313:25.