The efficiency of urine dipsticks for the diagnosis of Urinary Tract Infection

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INTRODUCTION

Urinary tract infection (UTI) is one of the most prevalent pathologies in developed countries, particularly in women[1], characterized by the presence of bacterial growth in any part of the urinary system.

Currently, urine culture is considered the *gold standard* method for the diagnosis of UTI. However, this method has several disadvantages including the time necessary for obtaining the results and the associated high costs[2]. Therefore, it has been studying the implementation of chemical methods, as dipsticks, including leukocyte esterase parameters, nitrites and the pH value, for the diagnosis of these infections, as shown by several studies[3,4,5] .

Objectives: Compare the sensibility, specificity, predictive value of a positive test and a negative test of both methods (urine culture vs chemical method) in order to determine the efficiency of the dipsticks method and also to characterize the microorganism more frequently isolated.

MATERIAL AND METHODS

141 urine samples from patients with suspected UTI were analyzed with both methods, namely the *gold standard* (urine culture) and the chemical method (dipsticks).

Sample collection

- Midstream method to sterile container;

Chemical Method

- Determination of leukocytes, nitrite and pH by the dipsticks;
- Manual and automatic readings (Urisys 2400);

Microbiological Method

- Fresh (urinary sediment) and direct (Gram) tests;
- Cultural examination: Columbia Sheep Blood Agar and MacConkey Agar (18-24 H / 37ºC / aerobic), spread with sterile loop (1µL);
- Identification and Antibiotic Sensitivity Test (VITEK®);

Statistical Treatment

- SPSS Statistics Package 20 (descriptive statistics, paired t test, McNemar test and Kappa coefficient;
- Sensitivity calculation, specificity and predictive values of a positive test and a negative test.

RESULTS & DISCUSSION

Table 1 - Results of Kappa coefficient and their compliance, when comparing the parameters under study and nitrites readout method.

Parameter	Kappa coefficient	Compliance
Culture - Nitrites	0,412	Fraca
Culture - Leukocyte esterase	0,655	Média
Culture – pH	0,185	Fraca
Culture – Coloration	0,914	Forte
Nitrites (strips) - Automatic nitrites	1,000	Perfeita

Table 2 - Sensitivity, specificity, predictive value of a positive test and a negative test for leukocytes, nitrite and pH.

Parameter	Sensitivity	Specificity	Predictive value of a positive test	Predictive value of a negative test
Leukocyte esterase	87,5%	89,9%	61,8%	97,2%
Nitrites	33,3%	98,3%	80,0%	87,8%
pH	20,8%	94,0%	41,7%	85,3%

Frequent microorganisms

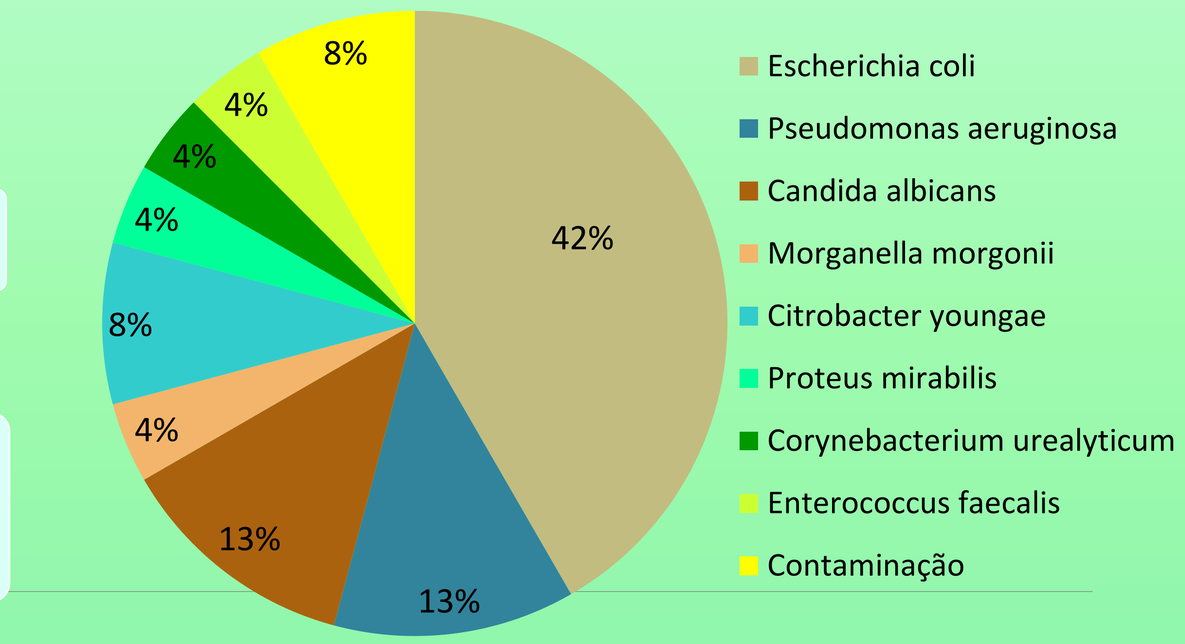

Figure 1 - Microorganisms isolated during the study.

For the leukocyte test, the sensibility, specificity, predictive value of a positive test and a negative test were, respectively, 87,5% , 88,9%, 61,8% and 97,2%. In the case of nitrites the determined sensibility, specificity, predictive value of a positive test and a negative test were 33,3%, 98,3%, 80,0% e 87,8%, respectively. Moreover pH test demonstrated a sensibility, specificity, predictive value of a positive test and a negative test of 20,8%, 94,0%, 41,7% e 85,3% respectively. Furthermore, *Escherichia coli* was the most frequent isolated microorganism.

We compared the results of manual and automatic methods of nitrite and pH. Nitrites did not showed significant differences, but the pH showed.

CONCLUSIONS

The results obtained indicate that the most reliable alternative for the diagnostics of urinary tract infections trough the chemical method (dipsticks) is the combination of nitrite and leukocyte tests. The great advantage is the exclusion of ITU by combining the result of leukocyte esterase with nitrites, that is, if both results are negative.

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