

Evaluation of Boric Acid and Mercuric Oxide Tablets for the Preservation of Urine for Delayed Urinalysis

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Amended Abstract

Urinary tract disease is a serious health problem affecting millions of people each year. The purpose of this study was to evaluate the effectiveness of two urine preservatives, boric acid and mercuric oxide, to observe any differences in chemical and microscopic analysis at room temperature for up to 72 hrs. The Cult-ur™ tablet (boric acid) is used as a preservative for urine cultures and the Stabilur™ tablet (mercuric oxide) is used as a preservative for urinalysis. We compared chemical and microscopic analysis with and without preservatives. Fresh urine specimens were obtained from 20 ICU patients. Each urine was divided into 12 conical tubes with 5 ml in each. The urine with preservatives were held at room temperature and the neat urine in the refrigerator. Tubes with preservatives were mixed to allow the tablet to dissolve. Testing was performed at 24, 48, and 72 hrs and compared. Chemical analysis was performed using the Clinitek 200+ instrument and Multistix 10 SG (Bayer). Controls were run in two levels for the chemical analysis. All positive proteins were verified using 20% SSA. Results indicate no significant clinical differences in microscopic analysis (leukocytes, erythrocytes, bacteria, epithelial cells, casts, crystals). Color, clarity, glucose, ketones, bilirubin, urobilinogen and nitrates showed no differences. There were minor differences observed between neat and preserved urines with specific gravity, pH, blood, protein and leucocytes, but not between boric acid and mercuric oxide preservatives. The data indicates that Cult-ur™ (boric acid) may be an alternative to Stabilur™ (mercuric oxide) for chemical and microscopic urinalysis as well as culture, which is encouraging due to toxic properties of mercuric oxide.

INTRODUCTION

The physical and chemical properties of urine have been indicators of disease for centuries. Examples include diabetes mellitus, various forms of glomerulonephritis, and chronic urinary tract infections. Routine urinalysis includes macroscopic examination of the urinary color, appearance, specific gravity, pH, protein, glucose, ketones, blood, leucocytes, nitrites, bilirubin and urobilinogen as well as a microscopic results. In order for the testing to be of value the urine specimen must be collected and transported properly. Improper collection and delay may invalidate laboratory results. Centralization of chemistry services are common occurrences and are part of the cost containment strategies that are part of health care today. Therefore the transportation of specimens to the laboratory in a timely fashion is of utmost importance. Unfortunately delay of specimens do occur. The purpose of this study was to compare two preservatives, boric acid (Cult-ur™) and mercuric oxide (Stabilur™).

METHODS

A total of 20 fresh urines were included in this study. Samples were divided into 12 conical tubes, 4 without preservative, 4 with a 75 mg boric acid tablet (Cult-ur™) and 4 with a 50 mg mercuric oxide tablet (Stabilur™). Each tube was aliquotted 5 ml (minimum fill). Tubes with the preservative were mixed until the tablets were dissolved. All urines without preservative were refrigerated, preserved urines were held at room temperature. Testing was performed initially at 0 hours. Subsequent testing was performed at 24, 48, and 72 hours and compared. Chemical analysis was performed using the Clinitek 200+ instrument and Multistix 10 SG (Bayer). Bio-rad Liquichek™ Urinalysis Control Levels 1 and 2 were run daily. Positive proteins were confirmed using 20% SSA. Microscopic analysis was performed. All data was compared.

RESULTS

Color, clarity, glucose, bilirubin, blood, protein, SSA, urobilinogen and nitrates showed no clinical differences. Minor differences were noted between neat and preserved urines with ketones on one patient. In all cases but one, leucocytes were not clinically different. As would be expected, the addition of the preservative altered specific gravity and pH. We observed that the pH of the urine with mercuric oxide became more acidic than the urines with boric acid. Specific gravity was increased by an average of .005 with the boric acid preservative and .010 with mercuric oxide preservative. Results of microscopic data showed no significant clinical differences. Erythrocyte amounts were clinically different in one sample, which may have been due to lysis. It was noted, that debris which is best described as a black crystalline deposit was present in numerous mercuric oxide samples only.

CONCLUSION

- Results indicate no significant clinical differences in the microscopic analysis.
- Mercuric oxide (Stabilur™) has toxic properties and potential physical hazards.
- Minor differences were observed between neat and preserved urines.
- Our data indicates that boric acid (Cult-ur™) may be an alternative to mercuric oxide (Stabilur™)