

Bacterial Urinary Tract Infections (UTIs) Associated with Diabetes

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Summary

100 (urine & blood) samples were collected from Al- Fayhaa hospital patients in Basrah governorate from July 2006 to July 2007.

81 patients were suffered from diabetes, the levels of fasting blood sugar were (100-350 mg\dl), and (200-500 mg\ dl) for random test. 19 patients were not diabetic (control).

The general urine examination (GUE) were carried out for each sample, 83 samples were positive for bacterial culture. The bacteria were identified by using the biochemical tests (catalase, oxidase, IMViC tests, H₂S production, urease, coagulase and growth in 6.5% NaCl), after Gram stain and motility test.

The Results showed that 37% of the isolates were *Escherichia coli*, 20% *Staphylococcus aureus*, 16% *Klebsiella pneumonia*, 7% *Proteus Sp.*, 5% *Staphylococcus epidermidis*, 5% *Pseudomonas aeruginosa* and 3% *Enterococcus faecalis*.

The general urine examination (GUE) showed that 94% of the patients have pus cells (5-15), which indicate the urinary tract infection (UTI), in addition to the casts, uric acid and amorphous crystals.

In conclusion, the study showed that patients with history of chronic diabetes (2-25 years) developed the urinary tract infection (UTI).

التهابات المجاري البولية المقترنه بالسكري

الخلاصه

جمعت ١٠٠ عينه من مراجعي مستشفى الفيحاء في محافظة البصره للفترة من تموز ٢٠٠٦ الى تموز ٢٠٠٧. ١٨ مريضا كانوا يعانون من مرض السكري، اذ تراوحت مستويات سكر الصيام لديهم الى (100-350 mg\dl)، و (200-500 mg\ dl) في حالة المرضى المتناولين للطعام. وكان هناك ١٩ مريض غير مصابين بالسكري استخدموا كسيطره.

فحصت العينات باستخدام الفحص العام والزرع الجرثومي لعينات الادرار، اذ لوحظ ان ٨٣ عينه كانت موجبه للزرع الجرثومي، شخصت العزلات الجرثوميه باستخدام الاختبارات البايوكيميائيه بعد تصبيغها بصبغة كرام واختبار الحركة.

اظهرت النتائج ان ٣٧% من العزلات تعود الى *Escherichia coli*، ٢٠% تعود الى *Staphylococcus aureus*، ١٦% *Klebsiella pneumonia*، ٧% *Proteus Sp*، ٥% *Staphylococcus epidermidis*، ٥% *Enterococcus faecalis* و ٣% *Pseudomonas aeruginosa*.

نتائج فحص الأدرار العام أظهرت أن ٩٤% من العينات يحوي خلايا قيقية (٥-١٥ خلية) مما يشير إلى وجود التهابات مجاري بوليه، إضافة إلى وجود بلورات ملحية وحامض اليوريك وبلورات غير منتظمة الشكل. تم الاستنتاج من نتائج البحث أن المرضى الذين يعانون من السكري المزمن لمدة تزيد عن السنتين يصابون بالتهابات المجاري البولية.

Introduction

The urinary tract infection (UTI) is a case where one or more structures in the urinary tract (from the kidney through ureters, bladder, and urethra) became infected after bacteria overcome its strong natural defense (Collee *et al.*, 1996; Baron, 2002).

Almost 95% of the UTI cases are caused by bacteria that multiply in the open end of the urethra and travel up to the bladder (Ascending route), less often, bacteria can reach the kidney from the blood stream (Descending route) (Stamm *et al.* 2001).

The UTI caused by a variety of bacteria that ascend into the urinary tract and establish bacteriuria at levels more than or equal to 10^5 colony forming units (CFU) \ ml (Collee *et al.*, 1996; Annabelle *et al.*, 1998; Suzanne *et al.*, 2000; Abdul & Onile, 2001).

Physicians classified the UTIs in different ways to help them choose the right treatments and determine the infectious agents, they divide it to primary and recurrent UTI depending on incidence of the infection, whether it happened to the first time or repeated frequently (Sotelo & Westney, 2003). The UTI can be also divided into complicated and uncomplicated UTI according to the factors that trigger the infection, the uncomplicated infections are only associated with bacterial infections, most often *E. coli* (Gleckman, 1992; Wood & Abrutyn, 1998).

Complicated infections are caused by bacteria also but combined with anatomical or structural abnormalities, such as, catheter in hospitalized patients, bladder or kidney dysfunction and kidney transplant (Hosking *et al.*, 1978), or it could be associated with diabetes mellitus or sickle cell anemia or sickle cell trait (Orenstain & Wong, 1999; Merck Manual of Diagnosis and Therapy).

According to the world health organisation (WHO) criteria in 1985, diabetes is defined as a fasting glucose concentration of ≥ 7.8 mmol \ L, a 2-h glucose concentration of ≥ 11.1 mmol \ L or the use of glucose reducing medication such as insulin or oral agents (WHO, 1985; Wahl *et al.*, 1997).

Diabetic patients have an increased risk of UTIs, due to repeated urination and glycosuria, many studies were proved this fact (Pozzilli, 1994; Garton *et al.*, 1992; Hoepelman *et al.*, 2003).

Many UTIs are a symptomatic (ASB), which is characterised by bacterial growth $> 10^5$ CFU \ ml of urine, and its unknown if the symptomatic UTI is precede by a symptomatic one (Osterby, 1986; Harding *et al.*, 2002).

The prevalence of ASB found to be higher in women with diabetes than non-diabetic women (Keane *et al.*, 1988), Brauner and his group were not able to confirm this finding (Brauner *et al.*, 1993). The complications that associated with the UTI in diabetic patient such as bacteraemia, renal abscess, renal papillary, and necrosis are higher than those in non-diabetic UTI patients (Patterson & Andiciele, 1997).

The symptoms of cystitis in diabetic patients are the same as for non-diabetic patients, however, because of the high incidence of unsuspected upper UTI in diabetic person, bilateral pyelonephritis is twice common in diabetic patients (Stamm & Hooton, 1993).

Material and Methods

Sample collection

Urine samples

Samples were collected from July 2006 to July 2007, from different ages, male and female patients attended Al-Fayhaa hospital in Basrah governorate. The sample was collected according to Clarridge et al. (1998). After asking the patient about the medication that he/she is taken (especially antibiotics), they were recommended to clean the vulva and labia in women, testes in men after washing hands thoroughly by soap, then pass a small amount of urine to get the mid stream, the urine was collected in sterile container and the patient was advised to close the container immediately.

Blood samples

About 2 ml of vein blood was taken from patients to measure blood sugar levels.

Urine examination

Examinations of urine colour, turbidity, acidity, microscopical examination, blood sugar and albumin were carried out according to WHO (1991) guidelines. Samples were divided into three parts: the first part was divided to two parts: centrifuged part was used for ordinary microscopic examination (pus, crystals, pH, parasites, epithelial cells), the uncentrifuged part was used for smear preparation and Gram staining. The pH was determined by using the pH disk divided into 1-4 different colours according to the pH change, the resulted colour was compare with the stander disk colour. The second parts of the sample was used for culture purpose, plated on routine culture media directly after collection, or if necessary stored at 4 °C to ovoid contamination. The third part was used for chemical examination such as sugar and albumin tests. Sugar level was tested by using Benedict's reagent, 5 ml of the reagent was added to 0.5 ml of urine and heated for 2 minutes with shaking, the positive results were recorded as reddish yellow to green colour was observed.

The albumin content was determined by adding 2 drops of sulphosalicylic acid to 5 mlk of urine, positive results were recorded if urine become turbid.

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