

Original Research Article

Clinical outcome and response of treatment in asymptomatic bacteriuria in type I and type II diabetes in women

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	International Archives of Integrated Medicine, Vol. 6, Issue 4, April, 2019. Copy right © 2019, IAIM, All Rights Reserved. Available online at http://iaimjournal.com/ ISSN: 2394-0026 (P) ISSN: 2394-0034 (O)
	Received on: 12-03-2019 Accepted on: 17-03-2019 Source of support: Nil Conflict of interest: None declared.
How to cite this article: S. Palanivel Rajan, I.V. Priyamvadha. Clinical outcome and response of treatment in asymptomatic bacteriuria in type I and type II diabetes in women. IAIM, 2019; 6(4): 26-30.	

Abstract

Back Ground: Asymptomatic bacteriuria is common in neonates, preschool children, in pregnant women, in elderly people, in diabetes mellitus, in catheterized patients and in patients with abnormal urinary tracts or renal disease. Few data, however, are available about the potential complications arising from asymptomatic bacteriuria for various populations and for various medical conditions.

The aim of the study: To study clinical outcome and response of treatment in asymptomatic bacteriuria in Type 1 and Type II Diabetes in women.

Materials and methods: 150 Diabetes mellitus patients without any urinary complaints such as dysuria, frequency, urgency, strangury, tenesmus, nocturia, nocturnal enuresis, incontinence, urethral pain, bladder pain, renal colic, who attended Diabetology Department as outpatients and in patients in various wards of Govt. Government Mohan Kumuramanglam Medical College, Between 2015- 2016 were enrolled for this study.

Results: 30% of the culture-positive cases occurred in 1 to 3 years duration group 24% of positive cases occurred in 5 to 10 years duration group. Of the 15 new cases, 5 cases were culture positive; the percentage of culture positive in new cases was 33.33%. 40% of culture-positive cases had random blood sugar value in the range of 201 mg% to 250 mg%. 24% of cases had random blood sugar value in the range of 151 mg% to 200 mg%. 15% of patients had a random blood sugar range of 251 mg% to 300 mg%. Of the 6 patients with diabetic nephropathy, 4 cases were culture positive, the positive culture percentage was 66.66%. Both cases of diabetic retinopathy are culture was positive. Both cases were grown E.coli. Of the 4 cases with ischemic heart disease, 2 cases were culture positive.

E.Coli was grown in culture positive cases in the study group was mostly highly sensitive to quinolones viz norfloxacin and ciprofloxacin and gentamicin. Other commonly used antibiotics like tetracycline, ampicillin, co-trimoxazole, cephalixin, nalidixic acid etc. were non-sensitive to E.coli. Klebsiella were grown in culture positive cases in the study group were 100% highly sensitive to quinolones.

Conclusion: Quinolones are used widely for the treatment of E coli causing UTIs and may also be used to treat other infections caused by other members of the Enterobacteriaceae family. There has been a significant increase in quinolone-resistant uropathogenic E. coli strains isolated from patients with UTI in several countries and therapeutic failures have been reported.

Key words

Urinary Tract Infection, Diabetes, Pyuria, E. coli.

Introduction

Diabetes mellitus is putatively associated with an increased risk of these infections as a result of poorly controlled plasma glucose concentrations, which in turn may impair granulocyte function and cell-mediated immunity [1]. Furthermore, the neurologic dysfunction associated with diabetic neuropathy may result in a neurogenic bladder with incomplete bladder emptying, urinary stasis, and retention. The increased likelihood of urethral instrumentation may predispose these patients to infection, as may diabetic microangiopathy, which can contribute to local ischemia and impaired host defences [2]. The new oral antidiabetic drug, sodium-glucose cotransporter-2 inhibitors, has a theoretical risk of increasing the urinary tract infection (UTI), but clinically, it has not been found to significantly increase the risk of symptomatic UTIs [3]. Type 2 diabetes is not only a risk factor for community-acquired UTI but also for health-care-associated UTI, catheter-associated UTI, and postrenal transplant-recurrent UTI. Asymptomatic bacteriuria (ASB) is defined as the presence of at least 10⁵ colony-forming units (CFU) per ml of 1 or 2 bacterial species in a clean-voided midstream urine sample from an individual without symptoms of a urinary tract infection (UTI), like dysuria, frequency, urgency, strangury, abdominal distention or fever. The urinary tract is usually sterile [4]. The risk of infection is higher and urinary tract infections are a serious clinical problem in patients with diabetes mellitus. Besides, the rate of upper

urinary tract involvement is much higher than in the general population. Emphysematous cystitis, pyelonephritis, renal and perinephric abscess, bacteremia, and renal papillary necrosis are more commonly seen in diabetic patients [5]. Infections also cause considerable morbidity and mortality in patients with diabetes mellitus. They may precipitate metabolic derangements and, conversely, the metabolic derangements of diabetes mellitus may facilitate infection [6].

Materials and methods

150 diabetes mellitus patients without any urinary complaints such as dysuria, frequency, urgency, strangury, tenesmus, nocturia, nocturnal enuresis, incontinence, urethral pain, bladder pain, renal colic, who attended Diabetology Department as outpatients and in patients in various wards of Govt. Government Mohan Kumaramangalam Medical College, Between 2015- 2016 were enrolled for this study.

Exclusion criteria: Pregnancy, Recent hospitalization or surgery (within the past 4 months), Known urinary tract abnormalities (including cytopathy or recent urinary tract instrumentation), Symptoms of UTI, The use of antimicrobial drugs during the previous 14 days. WHO criteria was applied to diagnose diabetes mellitus, then a detailed examination of patients carried out, particularly with regard to complications of diabetes routinely. A detailed gynecological examination carried out to rule out any gynecological problems, cystocele etc. Then

all patients were subjected to radiological investigations i.e. plain x-ray KUB and ultrasonogram of the urinary tract to rule out any structural abnormalities, obstruction.

Method of urine specimen collection: Clean-catch midstream urine collection method adopted. Patients were explained about the method of collecting clean-catch midstream urine and elderly female patients were provided with a nursing assistant for cleaning the external genitalia. Urine was collected in a sterile wide-mouthed screw cap bottle for culture purpose and another sample collected for microscopic examination of pyuria. Like these two

consecutive urine specimens were obtained, and refrigerated immediately, because it was not possible to plate all the samples of urine immediately. First, the number of pus cells/mm³ of urine was counted by using hemocytometer in the microscope.

Results

30% of the culture-positive cases occurred in 1 to 3 years duration group 24% of positive cases occurred in 5 to 10 years duration group. Of the 15 new cases, 5 cases are culture positive, the percentage of culture positive in new cases being 33.33% (**Table – 1**).

Table – 1: Duration of diabetes mellitus in culture positive cases.

Duration years	Type I DM	Type II DM	No. of patients	Percentage
New cases	1	4	5	11.90
Less than 1 year	1	5	6	14.28
1 to 3 years	4	9	13	30.95
3 to 5 years	---	3	3	07.14
5 to 10 years	2	8	10	23.80
10 to 15 years	---	4	4	09.52
> 15 years	---	3	3	06.81
Total	---	---	44	100.00

Table – 2: Random blood sugar values in culture positive cases.

Blood Sugar level mg/dl	Type I DM	Type II DM	No. of patients	Percentage
Up to 120	---	1	1	02.38
121 to 150	---	3	3	06.81
151 to 200	---	10	10	23.80
201 to 250	4	13	17	40.47
251 to 300	1	5	6	14.28
301 to 350	1	4		11.36
Above 350	2	---	2	04.76
Total	---	---	44	100.00

Table – 3: Pyuria in correlation to bacterial culture.

Total No. of positive culture	44
No. of the patient had more than 10 leucocytes / mm ³ of urine	35
Percentage	79.54

Table – 4: Response to treatment.

Total No. of positive Cases	44
No. of Patients showed response	39
Percentage	88.63

Table – 5: Response to treatment.

Organisms	Total Positive cases	No. of Response	Percentage	No. of cases required another course	Percentage
E.Coli	25	21	84	4	16.66
Klebsiella	15	14	93.33	1	7.15

40% of culture-positive cases had random blood sugar value in the range of 201 mg% to 250 mg%. 24% of cases had random blood sugar value in the range of 151 mg% to 200 mg%. 15% of patients had a random blood sugar range of 251 mg% to 300 mg% (**Table – 2**).

Totally 35 cases had more than 10 leucocytes/mm³ of urine measured by hemocytometer (**Table – 3**).

After a 14 days course of a full dose of sensitive antibiotics, in all the 44 culture positive cases, repeat urine culture was done. 39 cases had a response to treatment i.e. disappearance of bacteriuria after treatment. Of the 5 unresolved bacteriuria, 4 cases were E.coli and one case was Klebsiella group pathogens. In these 5 patients, another 14 days course of the full dose of appropriate antibiotics was given. At the end of the second course of antibiotics, these patients' urine became sterile (**Table – 4**).

E. Coli grown in culture positive cases in the study group is mostly highly sensitive to quinolones viz norfloxacin and ciprofloxacin and gentamicin. Other commonly used antibiotics like tetracycline, ampicillin, co-trimoxazole, cephalixin, nalidixic acid etc are non-sensitive to E.coli. Klebsiella grown in culture positive cases in the study group is 100% highly sensitive to quinolones. Other organisms grown in culture-positive cases are also sensitive to quinolones (**Table – 5**).

Discussion

The patients with diabetes mellitus have many potential reasons to have bacteriuria which in many instances may be asymptomatic, including poor control of blood glucose levels, diabetic neuropathy with neurogenic bladder and chronic

urinary retention, impairment of leucocyte function, frequent instrumentation of urinary tract, recurrent vaginitis and diabetic microangiopathy, and large vessel renal vascular disease [7]. Garau J, et al. reported that the prevalence rate of asymptomatic bacteriuria increased with longer duration of diabetes. In the present study, 30% of positive culture cases had diabetes for 1-3 years duration. Another 24% of cases had diabetes for 5 to 10 years duration. Even 33.33% of newly detected diabetes patients had a positive urine culture. Any patient with diabetes can have asymptomatic bacteriuria irrespective of their duration of disease [8]. Geerlings, et al. reported that the prevalence of asymptomatic bacteriuria is not affected by measures of glucose control. In the present study 40%, culture positive cases had random blood sugar value in the range of 201 to 250 mg%. Another 24% had in the range of 151 to 200%. 15% of patients had in the range of 251 to 300% [9]. The finding that the quality of diabetic control does not affect the prevalence of asymptomatic bacteriuria is confirmed [10]. Of the 6 patients with diabetic nephropathy 4 cases are culture positive. 2 cases of diabetic foot in the present study, not had any urinary tract infection. Of the 4 cases with ischemic heart disease, 2 cases are culture positive [11]. Other antimicrobials with over 80% sensitivity level included gentamicin, ceftazidime, augmentin, cefuroxime, and norfloxacin. All the organisms that are grown in culture in the present study were resistant to commonly used antibiotics like tetracycline, ampicillin, cotrimoxazole, cephalixin and nalidixic acid. All most all isolates are sensitive to quinolone group of drugs. Some are sensitive to aminoglycosides [12]. E.coli commonest organisms required a second course. Hiroshi Nikano, et al. (2001) reported that ASB cannot be correlated with

diabetes mellitus per se, but, the study suggests diabetic complications, especially neuropathy, are a contributory factor in the development of ASB in Diabetic Women [13].

Conclusion

Quinolones are used widely for the treatment of E coli causing UTIs and may also be used to treat other infections caused by other members of the Enterobacteriaceae family. There has been a significant increase in quinolone-resistant uropathogenic E. coli strains isolated from patients with UTI in several countries and therapeutic failures have been reported. Pyuria level of ≥ 10 leucocytes/mm³ of uncentrifuged urine correlates well with a positive urine culture. Most of the organisms are sensitive to quinolones only.

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