

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Prevalence of Asymptomatic Bacteriuria among Diabetic Women

Manjusha Pouranik

Assistant Professor, Department of Zoology, (Auto.) Mata Gujri College Jabalpur, Madhya Pradesh, India

Ayesha Siddiqua

Assistant Professor, Department of Zoology, (Auto.) Mata Gujri College Jabalpur, Madhya Pradesh, India

Sangeeta Sarkhel

Assistant Professor, Department of Zoology, (Auto.) Mata Gujri College Jabalpur, Madhya Pradesh, India

Abstract:

Introduction: Urinary tract infections (UTIs) are among the most common bacterial infections and frequently recurring problems among diabetic patients. The approach to these infections remains a difficult and sometimes controversial issue, especially in asymptomatic and symptomatic bacteriuria. The objectives of this study were to determine the incidence of ASB in diabetic patients considering age, duration, glycemic control and changing pattern of uropathogens..

Study Design: Random Sampling of urine was done to observe the prevalence of ASB in diabetic women. A well-structured questionnaire was administered to each patient to obtain her demographic data, diabetic history, associated medical/surgical conditions and detailed urinary symptoms. Place and Duration of Study: Study was done in the Central Zone of India (Madhya Pradesh) in Jabalpur City .Urine samples were collected between Feb2012 to April2012 from CHL Apollo Hospital and Marble City Hospital.

Methods: Urine cultures and urine analysis were performed on 123 urine specimens collected from diabetic patients. Quantitative bacteriologic cultures, identification of isolates were performed by standard methods.

Results: Only 50 urine samples were positive with a significant colony count. Ratio of Asymptomatic Bacteriuria and Symptomatic Bacteriuria was 38: 12. Escherichia coli was the predominant uropathogen (18.91%) isolated followed by Candida spp. (13.51%) Klebsiella spp(5.40), Pseudomonas spp (9.45%) Staphylococcus spp (10.81%).

Conclusions: The incidence of ASB is high in diabetic women and was not influenced by the patient's age, sex and duration of diabetes. Long term persistence of ASB can cause further complication.

1. Introduction

Diabetes Mellitus is the most common endocrine disease. Besides organ complications as retinopathy, nephropathy and neuropathy, diabetic patients also suffer more frequently from (complicated) infections compared with non diabetic patients. (1) In addition, a higher glucose concentration in the urine may create a culture medium for pathogenic microorganisms. (2) Diabetic patients may also be prone to endogenous infections. Colonization by abnormal flora, in particular aerobic Gram-negative bacilli, is substantially more common in diabetic patients than in control subjects. (3) Diabetes mellitus (DM) has a number of effects on genitourinary system. Patients with Type1 DM and Type 2 DM are at increased risk for urinary tract infection. (4) In addition, many studies have showed that diabetic subjects, especially women, show high prevalence of asymptomatic bacteriuria (ASB) [4,5]. In diabetic women, various risk factors for ASB have been suggested including age, low body mass index (BMI) and UTIs during the previous year [6]. In a prior study, ASB was a risk factor for subsequent declines in renal function among women with type 1 diabetes mellitus[7] Term Asymptomatic bacteriuria (ASB) refers bacteria present in urine in the absence of clinical signs or symptoms of urinary infection in the host. The microbiologic definition is usually greater than or equal to 10⁵ colony-forming units per milliliter of the same organism or organisms in two consecutive urine specimens. (5) The most common infecting organism in diabetic women with ASB is Escherichia coli; other organisms include Klebsiella species, Enterococcus species, and group B Streptococcus species (Streptococcus agalactiae). (3) Klebsiella spp. tends to affect people with underlying diseases, such as alcoholism, diabetes and chronic lung disease. The objective of this study was to investigate the incidence and the changing pattern of etiologic agents of ASB in women with Diabetes and to assess its relation with some possible risk factors such as age, duration of Diabetes and, complications due to persistence of ASB.

2. Materials & Methods

This study was conducted on 123 female diabetic patients between Feb2012 to April2012. A well-structured questionnaire was administered to each patient to obtain her demographic data, diabetic history, associated medical/surgical conditions and detailed

urinary symptoms. Mid stream urine samples (M.S.U) were collected in culture bottles. Plates of Nutrient agar and McConkey medium were aseptically incubated with 2–3 drops urine sample and then incubated at 37 °C for 24–48 hours or until visible growth appeared. Those culture reports were considered positive who had colony forming units more than 105 /ml of voided urine. Identification was done by Gram Staining and IMVIC tests

3. Results

Total 123 Diabetic patients were taken in the present study. 50 (40.65%) subjects showed significant colony Table 1. shows relation of age with UTI. Early onset of type 2 diabetes (age group 21-30years) was observed with UTI. Predominant infection was found due to gram negative bacteria (Table2) Incidence of ASB(38cases) was higher as compare to Symptomatic bacteriuria (12cases) Table 3. *E.coli* (14 no) was the most common pathogen followed by *Candida spp*(10) Table 4. Younger population is more susceptible to *klebsiella spp.* as the high incidence was observed at the age group 21-30. Whereas postmenopausal showed a high incidence of Candidiuria. Table4 represent status of Blood sugar with UTI. Table5 gives idea of duration and incidence of UTI

| Age | Total Cases of Female | Women with UTI | % |
|-------|-----------------------|----------------|-------|
| 21-30 | 4 | 4 | 100 |
| 31-40 | 15 | 6 | 33.33 |
| 41-50 | 43 | 13 | 27.9 |
| 51-60 | 34 | 18 | 55.88 |
| 61-70 | 19 | 8 | 42.10 |
| 71-80 | 6 | 1 | 16.66 |
| 81-90 | 02 | 1 | 50 |

Table 1: Relation between age and UTI UTI and Age

| Age group | Symptomatic Bacteriuria | Asymptomatic Bacteriuria |
|-----------|-------------------------|--------------------------|
| 21-30 | 1 | 3 |
| 31-40 | - | 6 |
| 41-50 | 5 | 7 |
| 51-60 | 4 | 14 |
| 61-70 | 02 | 06 |
| 71-80 | - | 01 |
| 80-90 | - | 01 |

Table 2: Ratio of Symptomic and Asymptomic UTI and Age

| Organism | No. | % |
|-----------------------|-----|-------|
| <i>E coli</i> | 14 | 18.91 |
| <i>klebsiella</i> | 4 | 5.40 |
| <i>Staphylococcus</i> | 8 | 10.81 |
| <i>Pseudomonas</i> | 7 | 9.45 |
| <i>Citrobacter</i> | 5 | 6.75 |
| <i>Serratia</i> | 4 | 5.40 |
| <i>Shigella</i> | 3 | 4.05 |
| <i>Salmonella</i> | 1 | 1.35 |
| <i>Candida</i> | 10 | 13.51 |
| Other | 18 | 24.32 |

Table 3: Percentage of causal organisms of UTI

| Bloodglucose (Random) | Total No. of patients | No. of Patients with UTI | % |
|-----------------------|-----------------------|--------------------------|-------|
| 80-130 | 49 | 14 | 28.57 |
| 131-170 | 19 | 06 | 31.5 |
| 171-220 | 23 | 05 | 21.7 |
| 221-270 | 26 | 15 | 57.69 |
| Above 271 | 9 | 03 | 33.33 |

Table 4: Relation of Blood Sugar and UTI

| Duration (Years) | Total Patients | Patients With UTI | % |
|------------------|----------------|-------------------|-------|
| 1> | 09 | 03 | 33.33 |
| 01-05 years | 25 | 6 | 24 |
| 06-10 years | 27 | 12 | 44.44 |
| 11-15 years | 13 | 4 | 30.76 |
| Above 16 years | 5 | 01 | 20 |

Table 5: Relation of duration and UTI Patient

4. Discussion

In the present study out of 123 patients 38 were found with asymptomatic bacteriuria (41.17%) this is comparable from previous reports as Bhushan and Tiwari (11) reported that asymptomatic bacteriuria is prevalent in women with diabetes from the northern side of India, same results were observed by Sibi et al (8). Worldwide reports also strengthen the observations from Africa (12) 22.5%, Netherland (13) (26%), Turkey (15) 25.5% and from Nepal (17) 9.43% in elderly population. E. coli was observed as most frequent urine pathogen in 28% of diabetics which was in accordance with the finding of previous studies as Sibi et al (8) 2011 reported 39%, Bashir et al (15) 2008 (66%), Shill et al (16) 2010 reported 22%. Previous reports show that E. coli was found to be in lower proportion in an elderly population, whereas most frequently observed in younger diabetics (17,19) our report supports the view but other pathogens were equally important, pattern of infection was E. coli > Staphylococcus > Pseudomonas > Citrobacter > Klebsiella. We have observed that Klebsiella spp is the commonest pathogen among younger diabetics. The second most common pathogen was Klebsiella spp. was reported by Bajaj et al (19) 1999, Ophory et al (20) 2010 this suggests the changing pattern of organisms causing infection in the population. Although, age has also been postulated as the most important risk factor for ASB in type 2 diabetic patients in some reports [13,17], in the current study we could not find any association. Duration (Years) Total Patients Patients With UTI %

| Duration (Years) | Total Patients | Patients With UTI % |
|------------------|----------------|---------------------|
| 1-5 | 33 | 33.33 |
| 6-10 | 25 | 24.00 |
| 11-15 | 27 | 44.44 |
| 16-20 | 13 | 30.76 |
| Above 20 | 5 | 20.00 |

Blood glucose (Random) Total No. of patients No. of Patients with UTI %

| Blood glucose (Random) | Total No. of patients | No. of Patients with UTI % |
|------------------------|-----------------------|----------------------------|
| 80-130 | 49 | 28.57 |
| 131-170 | 19 | 63.15 |
| 171-220 | 23 | 21.74 |
| 221-270 | 26 | 15.38 |
| Above 271 | 9 | 33.33 |

between age and the presence of ASB in diabetic women. In contrast, therefore, it can be concluded that, other factors such as sexual activity and menstrual period in young diabetic women may be included as predisposing factors for progression of ASB to symptomatic UTI. This is worth further future study and investigation. Some reports [16,18] have shown that the duration of diabetes is associated with ASB in diabetic patients. In the present study, we could not find any association between duration of diabetes and presence of ASB. Meilland et al. [14] have also reported that this relationship was not present in patients with diabetes type 2 and only was found between ASB and diabetes type 1.

CONCLUSIONS

Study supports by worldwide report that prevalence of ASB was higher with diabetes than without (9.9 VS 5.4) and it increase 1.9 fold with each 10 years in diabetes duration (13,18,19, 23,24, 25) so prompt and early diagnosis recommended to avoid further complication

5. Acknowledgement

We are grateful to Madhya Pradesh Science and Technology India for providing financial support.

6. References

- Hoepelman I.M., Ruby M, Suzanne E. G 2003: Pathogenesis and management of bacterial urinary tract infections in adult patients with diabetes mellitus, International Journal of Antimicrobial Agents, S35- S43.
- Edward J. B., Stephan D. F., Delia S., Linn A., Barbara M., 2005 Risk of Urinary Tract Infection and Asymptomatic Bacteriuria among Diabetic and Nondiabetic Postmenopausal Women, American Journal of Epidemiology: 161:557-564.
- Soichiro Y, Hiroshi Y, Misa S, Tsuyoshi S, Sumii Y and Fumiaki S., 2000 Longer-Term Diabetic Patients Have a More Frequent Incidence of Nosocomial Infections After Elective Gastrectomy, Economics And Health Systems Research, 91:1176-81.
- Geerlings SE, Stolk RP, Camps MJ, Netten PM, Hoekstra JB, Bouter PK, Braveboer B, Collet TJ, Jansz AR, Hoepelman AM. 2000: Asymptomatic bacteriuria may be considered a complication in women with diabetes. Diabetes Care. 23:744-749.
- Geerlings SE, Stolk RP, Camps MJ, Netten PM, Collet JT, Schneeberger PM, Hoepelman AI. 2001: Consequences of asymptomatic bacteriuria in women with diabetes mellitus. Arch Intern Med, 161:1421-1427
- Baloch G, Jaffery M, Madhudas C, Devrajani B, Shah S. 2011: , Urinary tract infection frequency and pattern in patient with diabetes mellitus, Professional Med J, 18(3): 466-469.
- Lindsay E N, 2003: Asymptomatic bacteriuria; when to screen and when to treat, Infect Dis Clin N Am.; 367-394.
- Sibi G, Devi A, Fouzia K and Patil B. 2011 , Prevalence, Microbiological profile of urinary tract infection and its treatment with trimethoprim in diabetic patients, Research journal of microbiology.; 6(6): 543-551.
- Geerlings S E, Brouwer E C, Gaastra W. 1999: Effect of glucose and pH on uropathogenic and non-uropathogenic Escherichia coli: studies with urine from diabetic and non-diabetic individuals, Journal of Medical Microbiology. 48:535-539.
- Boroumand A, LSam, S Abbasi, M Salarifar, E Kassaian and S Forghani. 2006: Asymptomatic bacteriuria in type 2 Iranian diabetic women: a cross sectional study, BMC Women's Health, 6:4: 10.1186/1472-6874-6-4.
- Bhushan R and Tiwari S, 2001 Urinary tract infection- A suitable approach, J. Ind. Acad. Med, 2:331-337
- Joffe B L, Seftel H.C., distiller L.A. 1974, Asymptomatic bacteriuria in diabetes mellitus, S Afr Med J, 1:306-308.
- Geerlings SE, Edith WMT ter Braak, Manuel C, Castro Cabezas, Timon W van Haeften, Ligtenberg-Oldenburg C, et al. 2000: The Diabetes Mellitus Women Asymptomatic Bacteriuria Utrecht (DWABU) Study Group: Asymptomatic bacteriuria may be considered a complication in women with diabetes, Diabetes Care, 1 - 11.
- Kalestimur F, Unal A, Pasaoglu H, 1990 Asymptomatic bacteriuria in patients with diabetes mellitus, Turkish mikrobiyoloji, 24:126-32
- Jha BK, Singh YI, Khanal LK, Yadab VC , Sanjana RK, 2009: Prevalence of asymptomatic bacteriuria among elderly diabetic patients residing in Chitwan, Kathmandu University Medical Journal ,; Vol. 7, No. 2, Issue 26:157-161

16. Bashir M.F., Qazi J. I., Ahmad N., Riaz S. 2008: Diversity of urinary tract pathogens and drug resistant isolates of *Escherichia coli* in different age and gender groups of Pakistanis, *Tropical Journal of Pharmaceutical Research* 7:1025-1031
17. Shill M. C., Huda N.H., Moain F.B., Karmakar U.K, 2010: Prevalence of uropathogens in Diabetic Patients and their corresponding resistance pattern: result of a survey conducted at diagnostic centers in Dhaka, Bangladesh, *Oman Medical Journal*, Vol. 25:Issue 4.
18. Bonadio M., Costarelli S., Morelli G., Tiziana T. 2006: The influence of diabetes mellitus on the spectrum of uropathogens and the antimicrobial resistance in elderly adult patients with urinary tract infection, *BMC Infectious Diseases*, 6:54
19. Boyko E. J., Stephan D. F., Delia S., Linn A., Barbara M., 2005: Risk of Urinary Tract Infection and Asymptomatic Bacteriuria among Diabetic and Nondiabetic Postmenopausal Women, *American Journal of Epidemiology*, 161:557–564
20. Lindsay E. N. 2000: Asymptomatic Bacteriuria – Important or Not?, *The New England Journal of Medicine*, 343: 1037-1039.
21. Bajaj, J.K., Karyokarte R.P., Kulkarnim J.D., Deshmukh A.B. 1999: Changing etiology of urinary tract infections and emergence of drugs resistance as a major problem. *J. Commun. Dis.*, 31: 181-184.
22. Ophori E. A., Imade P. and Johnny E. J. 2010;, Asymptomatic bacteriuria in patients with type-2 diabetes mellitus *Journal of Bacteriology Research*, Vol. 2(2): pp. 14-17.
23. Shmitt JK, Fawcett CJ, Gullickson G Asymptomatic bacteriuria and haemoglobin A1. *Diabetes Care*. 1986; 9: 518-20.
24. Keane E. M., Boyko E. J., Reller L. B., Hamman R. F. 1998: Prevalence of asymptomatic bacteriuria in subjects with NIDDM in San Luis Valley of Colorado, *Diabetes Care*.:11; 708-12.
25. Turan H, Serephanoglu K, Torun AN, Kulaksizoglu S, Kulaksizoglu M, Pamuk B, Arslan H, 2008; Frequency, risk factors, and responsible pathogenic microorganisms of asymptomatic bacteriuria in patients with type 2 diabetes mellitus. *Jpn J Infect Dis*, 61(3):236-8.
26. Alebiosu C. O., Osinupebi O. A., Olajubu F. A. 2003; , Significant asymptomatic bacteriuria among Nigerian type 2 diabetics. *Journal of National Medical Association*, 95(5): 344–349.
27. Meiland R, Geerlings SE, Stolk RP, Hoes AW, Hoepelman AI. 2004 History taking and leukocyturia predict the presence of asymptomatic bacteriuria in women with diabetes mellitus. *Eur J Epidemiol*; 19:1021-1027.