e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(4); 1107-1111

Original Research Article

A Study on Asymptomatic Bacteriuria in Women with Diabetes Mellitus

Veeranna Addanki[1], Kummamuru Ravi[2], Srikanth Dubbaka[3], Rajiv Kumar Bandaru[4], T Jaya Chandra[5]

[1]Assistant Professor, Department of General Medicine, ESIC Medical College, Hyderabad.
[2]Assistant Professor, Department of General Medicine, Mallareddy Medical College for Women, Hyderabad.
[3]Assistant Professor, Department of General Medicine, ESIC Medical College, Hyderabad.
[4]Associate Professor, Department of General Medicine, ESIC Medical College, Hyderabad.
[5]Professor, Department of Microbiology, GSL Medical College, Rajahmundry.

Received: 22-01-2023 / Revised: 20-02-2023 / Accepted: 30-03-2023
Corresponding author: Kummamuru Ravi
Conflict of interest: Nil

Abstract

Introduction: Urinary tract infections (UTIs) are clinically relevant problem for patients with diabetes mellitus (DM). Many UTIs are asymptomatic especially in women. Hence a study was conducted to estimate the prevalence of asymptomatic bacteriuria among women with DM and also to identify the causative organisms with its antibiogram.

Methods: It was a prospective research conducted in the department of general medicine, ESIC medical college, Hyderabad. Study was conducted between Women with DM were included in this research. Women with symptoms of UTI, those catheterised 2 months before the study, those proceeded for urogenital instrumentation 2 months before the study, pregnant women, those used antibiotics 14 days prior to the study, those with gynecological infections, non-cooperative women were not considered in this research. The participants were thoroughly explained about the collection of mid-stream urine (MSU). Nursing assistance was also provided for elders. Urine was collected in a sterile wide mouthed screw cap bottle for culture as well as microscopy. Culture of urine specimen, identification of the pathogens along with antimicrobial sensitivity were carried as per the guidelines.

Results: Total 200 members were included in the test and 75 in control group; mean age was 52.2 ± 11.5 and 51.7 ± 11.9 years, respectively. The rate of significant bacteriuria (SB) was 68 and 6, respectively in the groups (Table 1). In the test group, *Escherichia coli* (56; 82%) was the leading causative agent followed by *Klebsiella pneumoniae* (6), coagulase negative staphylococcus (CoNS). Majority isolates from diabetic women were susceptible to conventional antimicrobial drugs.

Conclusion: This study showed that the prevalence of asymptomatic bacteriuria is higher in diabetic women, age is an important risk factor. Longer duration of diabetes has increased risk of asymptomatic bacteriuria.

Keywords: Diabetes, Women, Study, Bacteria.

Introduction

Diabetes mellitus (DM) comprises a group of common metabolic disorders that share the phenotype of hyperglycemia. [1] The metabolic deregulation associated with DM leads to pathophysiologic changes in various systems that causes tremendous burden on the health care system. The complications of DM affect many organ systems, responsible for associated morbidity and mortality. [2]

Individuals with DM exhibit greater frequency and severity of infection. But introduction of insulin is major breakthrough. Urinary tract infections (UTIs) are clinically relevant problem for patients with DM. Severe complications of UTI may occur in patients with diabetes. [3] DM individuals may present with distressing picture showing definite progression of pyelonephritis characterized by evidence of systemic infection, local extension of the infection, septicemia, and severe impairment of metabolic control; this may become difficult to manage. Hence diabetes is considered to be predisposing factor for UTI.

Many UTIs are asymptomatic especially in women. Most of the symptomatic infections are preceded by asymptomatic bacteriuria. Hence a study is conducted to estimate the prevalence of asymptomatic bacteriuria among women with DM and also to identify the causative organisms with its antibiogram.

Methods

It was a prospective research conducted in the department of general medicine, ESIC medical college, Hyderabad. Study was conducted between Women with DM were included in this research. Women with symptoms of UTI, those catheterised 2 months before the study, those proceeded for urogenital instrumentation 2 months before the study, pregnant women, those used antibiotics 14 days prior to the study, those with gynecological infections, non-cooperative women were not considered in this research. Informed consent was obtained from the patients and the control group.

Non diabetic women were considered to be the control group. From the recruited participants, detailed history such as age, known duration of diabetes, medication, pregnancy, history for UTI, history of previous catheterization, instrumentation, and history of white discharge and history of pruritus vulva were collected and the findings were recorded. Gynecological examination was carried to rule out infections. Subsequently, fasting and post prandial plasma glucose tests were carried on the test and control groups.

The participants were thoroughly explained about the collection of mid-stream urine (MSU). Nursing assistance was also provided for elders. Urine was collected in a sterile wide mouthed screw cap bottle for culture as well as microscopy. Culture of urine specimen, identification of the pathogens along with antimicrobial sensitivity were carried as per the guidelines.

Results

Table 1: Significant bacteriuria (SB) in the study participants

Group	SB	Non SB	Total
Test	68	132	200
Control	6	69	75
Total	74	201	275
Statistical analysis	Statistically not significant; P<0.05		

Total 200 members were included in the test and 75 in control group. The mean age was 52.2 ± 11.5 and 51.7 ± 11.9 years, respectively. In the test group, 7.8 ± 6.0 years was the mean DM duration, 126.9 ± 44.0 mg/dl and 207.7 ± 54.9 mg/dl were the mean fasting and post prandial blood glucose values, respectively.

The rate of significant bacteriuria (SB) was 68 and 6, respectively in the groups (Table 1). In the test group, *Escherichia coli* (56; 82%) was the leading causative agent followed by *Klebsiella pneumoniae* [6], coagulase negative staphylococcus (CoNS) [4] and *Proteus mirabilis* [2]. Whereas in the control group, *Escherichia coli* [5] and CoNS [1]. Majority isolates from diabetic women were susceptible to conventional antimicrobial drugs; 35% were resistant to Ampicillin, 23% were resistant to Ciprofloxacin, 11% were resistant to Norfloxacin and 16% to Nalidixic acid. Similar drug resistance pattern was exhibited by the isolates of the control group.

Discussion

In this study, the prevalence of asymptomatic bacteriuria was higher in women with DM (34 vs. 8%).But no significant difference was reported in the literature. As per the Geerlings *et al*. [6] report, the prevalence of asymptomatic bacteriuria among diabetic women was 26% and 6% in non DM. whereas it was 32% and11% in DM and non DM women, respectively by Makuyana *et al*. [7] report. It was also reported to be 3.5fold in Keane *et al*. [8] study.

Age is important as well as known risk factor for bacteriuria among the women with and or without DM. In the present study also, age was identified to be an important risk factor. In the previous reports there was no increased incidence of asymptomatic bacteriuria in elderly women with diabetes. [9] But an increased incidence was reported by Geerlings *et al*. [6]

In the present study, significant correlation was found between the known duration of DM and asymptomatic bacteriuria among the diabetic women. The mean duration of DM was 9.1 ± 6.4 years and 7.1 ± 5.7 years respectively among the groups. Geerlings *et al*. [6] found statistically significant correlation between the duration of DM and asymptomatic bacteriuria. Similar findings were reported by Vejlsgaard *et al*. [10] and Keane *et al*. [8]

The mean duration of DM was significantly greater in diabetic women with bacteriuria; 9.9 + 1.5 vs. 5.4 ± 0.4 years. It was reported that higher incidence of asymptomatic bacteriuria with long duration of DM may contributed to autonomic dysfunction of the bladder which promotes stasis of urine and infection. [11, 12] Significant correlation was found between metabolic control of diabetes and asymptomatic bacteriuria among the diabetic women.

Both fasting and postprandial plasma glucose values correlated with presence of bacteriuria. Bacterial growth can be increased by addition of glucose. Mendoza *et al*. [13] Geerlings *et al*. [6] and Renko *et al*. [12] did not find any association between bacteriuria and fasting blood glucose. But significant correlation was reported by Kelestimur *et al*. [14]

Escherichia coli was the commonest cause of asymptomatic bacteriuria; the incidence was 56 and 5 respectively in the test and control groups. Makuyana *et al*. [7] and Mendoza *et al*. [13] reported similar findings. In this research, *Klebsiella pneumoniae*, CoNS, Staphylococcus aureus and *Proteus mirabilis* are the other isolates. Similar isolates were found in the literature also. [13, 14, 15] There was no authenticated treatment for asymptomatic bacteriuria in diabetic patients. Many experts recommend treatment based on the frequency and severity of upper urinary tract infections. [16] On the other hand few

experts believe that the benefit of treatment of asymptomatic bacteriuria is doubtful. At this time, whether diabetic patients with asymptomatic bacteriuria should be treated is not known because whether treatment of asymptomatic bacteriuria prevents the development of symptomatic urinary tract infection or a decline in renal function is not clear. Long term

Follow up studies can show the effect.

Conclusion

This study showed that the prevalence of asymptomatic bacteriuria is higher in diabetic women, age is an important risk factor. Longer duration of diabetes has increased risk of asymptomatic bacteriuria

References

1. Sheiner E. Gestational Diabetes Mellitus: Long-Term Consequences for the Mother and Child Grand Challenge: How to Move on Towards Secondary Prevention? Front Clin Diabetes Healthc. 2020; 1: 546256.
2. Daryabor G, Atashzar MR, Kabelitz D, Meri S, Kalantar K. The Effects of Type 2 Diabetes Mellitus on Organ Metabolism and the Immune System. Front Immunol. 2020; 11: 1582.
3. Kao CY, Zhang YZ, Yang DC, Chen PK, Teng CH, Lin WH, Wang MC. Characterization of host and escherichia coli strains causing recurrent urinary tract infections based on molecular typing. BMC Microbiol. 2023; 23(1): 90.
4. Abdel Gawad AM, Ashry WMO, El-Ghannam S, Hussein M, Yousef A. Antibiotic resistance profile of common uropathogens during COVID-19 pandemic: hospital based epidemiologic study. BMC Microbiol. 2023; 23(1): 28.
5. Mobile phones
6. Geerlings SE, Stolk RP, Camps MJ, Netten PM, Hoekstra JB, Bouter KP, Bravenboer B, Collet JT, Jansz AR, Hoepelman AI. Asymptomatic bacteriuria may be considered a complication in women with diabetes. Diabetes Mellitus Women Asymptomatic Bacteriuria Utrecht Study Group. Diabetes Care. 2000; 23(6): 744 – 9.
7. Makuyana D, Mhlabi D, Chipfupa M, Munyombwe T, Gwanzura L. Asymptomatic bacteriuria among outpatients with diabetes mellitus in an urban black population. Cent Afr J Med. 2002; 48: 78 – 82.
8. Keane EM, Boyko EJ, Reller LB, Hamman RF. Prevalence of asymptomatic bacteriuria in subjects with NIDDM in San Luis Valley of Colorado. Diabetes Care. 1988; 11(9): 708 – 12.
9. Vejlsgaard R. Studies on urinary infections in diabetics II. Significant bacteriuria in relation to long-term diabetic manifestations. Acta Med Scand 1966; 179:1838.
10. Vejlsgaard R. Studies on urinary infection in diabetics. II. Significant bacteriuria in relation to long-term diabetic manifestations. Acta Med Scand. 1966; 179(2): 183 – 8.
11. Sawers JS, Todd WA, Kellett HA, Miles RS, Allan PL, Ewing DJ, Clarke BF. Bacteriuria and autonomic nerve function in diabetic women. Diabetes Care. 1986; 9(5): 460 – 4.
12. Renko M, Tapanainen P, Tossavainen P, Pokka T, Uhari M. Meta-analysis of the significance of asymptomatic bacteriuria in diabetes. Diabetes Care. 2011; 34(1): 230 – 5.
13. Mendoza T, García de los Ríos M, Lafourcade M, Soto C, Durruty P, Alvo M. Bacteriología urinaria asintomática en mujeres diabéticas tipo 2 [Asymptomatic bacteriuria in type 2 diabetics women]. Rev Med Chil. 2002; 130(9): 1001 – 7.
14. Keleştimur F, Unal A, Paşaoğlu H, Başar E, Kiliç H, Doğanay M. Diabetes mellitus'lu hastalarda asemptomatik

bakteriüri [Asymptomatic bacteriuria in patients with diabetes mellitus]. Mikrobiyol Bul. 1990; 24(2): 126 – 32.
15. Geerlings SE, Meiland R, Hoepelman AI. Pathogenesis of bacteriuria in women with diabetes mellitus. Int J Antimicrob Agents. 2002; 19(6): 539 – 45.
16. Honest H, Forbes CA,DuréeKH, Norman Norman G, Duffy SB, Tsourapas A, Roberts TE, Barton PM, Jowett SM, Hyde CJ, Khan KS. Screening to prevent spontaneous preterm birth: systematic reviews of accuracy and effectiveness literature with economic modelling. Health Technol Assess. 2009; 13(43): 1 – 627.