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Clinical and Laboratory Profile of Type 2 Diabetic Patients with Asymptomatic Bacteriuria

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Abstract
Background: *Diabetes leads to several abnormalities of the host defence system that may result in higher risk of certain infection including UTI[2]. These include immunologic impairment such as impaired migration, intra cellular killing, phagocytosis, chemotaxis of polymorphonuclear leukocytes from diabetic patients[3] and neuropathic complications such as impaired bladder emptying[4].*
Aim: *The aim of the study was to study the prevalence of asymptomatic bacteriuria in diabetics and non diabetics age <45 years and to study the clinical and laboratory parameters in patients with asymptomatic bacteriuria.*
Materials and Methods: *A cross sectional comparative study in 90 diabetics and 90 non-diabetics. During initial visit relevant details and history regarding the patients are collected like age, duration of diabetes, medications, pregnancy, history of hospitalisation, catheterization, surgery, history pertaining to urinary symptoms and gynaecological infections like dysuria, frequency of micturition, history of white discharge, pruritis vulva. Relevant investigations like fasting and post prandial sugar , urine analysis, urine culture and sensitivity, renal function tests, ultra sound for PVR, urine microalbuminuria, screening for diabetic retinopathy and neuropathy to be carried out (Questionnaire attached).*
Results: *In our study the prevalence of Asymptomatic bacteriuria in diabetic patients ≤45 years is 21.1%. There was no significant correlation between Asymptomatic bacteriuria and post void residual urine.*
Conclusion: There was significant association between Asymptomatic bacteriuria and retinopathy. There was no association between Asymptomatic bacteriuria and peripheral neuropathy, IHD, CAD, peripheral vascular disease and nephropathy. There was significant association between poor glycemic control, duration of diabetes and Asymptomatic bacteriuria signifying the importance of metabolic control.
Keywords: *Asymptomatic bacteriuria, Post voidal urine, Body mass index, Type2 Diabetes mellitus, Ischemic heart disease, Colony forming units, Coronary artery disease.*

Introduction

Diabetes leads to several abnormalities of the host defence system that may result in higher risk of certain infection including UTI[2]. These include immunologic impairment such as impaired migration, intra cellular killing, phagocytosis, chemotaxis of polymorph nuclear leukocytes from diabetic patients[3] and neuropathic complications such as impaired bladder emptying[4]. The increased glucose concentration in urine may serve as culture medium for various pathogenic microorganisms[5].

Individuals with DM have a greater frequency and severity of infection[1]. Urinary tract is the most common site for infection. Lower genitourinary tract disease in diabetic patients is of particular concern because of the perception that these patients tend to have more complicated infection of upper urinary tract. ASB is much more common in diabetic women[4] compared to diabetic men. Various risk factors for ASB in women with diabetes have been suggested including sexual intercourse, age, and duration of diabetes and metabolic control[6-12]. Also anatomic factors such as short urethra may be responsible for higher susceptibility of females to these infections.

The term asymptomatic bacteriuria refers to the presence of positive urine culture in an asymptomatic person. ASB is common in neonates, pre-school children, pregnant women, elderly people and diabetics. Various studies have been conducted to analyse the risk factors for ASB in diabetic patients. Many studies have been conducted to estimate the frequency of asymptomatic bacteriuria in diabetic men and women. There have been studies which have recommended screening of patients with diabetes to detect and treat diabetes with ASB because of increased frequency and severity of upper urinary tract infections in such patients. Most of the studies done on this condition have been in Europe and North America[13]. There are hardly any reports from south India, hence this study was done in our hospital which is a tertiary care centre in south India with a view of looking into potentially modifiable risk factors like diabetic cystopathy, glycemic control, weight reduction etc.

Aim

1. The aim of the study was to study the prevalence of asymptomatic bacteriuria in diabetics and non diabetics age <45 years and to study the clinical and laboratory parameters in patients with asymptomatic bacteriuria.
2. The study also intended to determine if there was any correlation between ASB and age, BMI, duration of diabetes and metabolic control. It was also intended to determine the prevalence of microvascular and macrovascular complications in patients with ASB.

Materials and Methods

This is a cross sectional comparative study done at Institute of Non-communicable Diseases, Government Royapettah Hospital, Kilpauk Medical College, Chennai. The study was conducted on 90 diabetic patients age <45 years and 90 non diabetic patients <45 years taken as controls. Inclusion criteria were patients with Type 2 diabetes age <45 years who gave written voluntary consent were recruited. Whereas patients with features of lower urinary tract infection (dysuria with frequency or urgency). Patients who had taken antibiotics in the previous two weeks. Women with history of sexual intercourse one week prior. Pregnant women.

H/O Instrumentation of the urogenital tract in the previous two months. Recent hospitalisation or surgery in past 4 months. Patients with gynaecological infections. Patients with history of ureteric/renal calculus and subjects unwilling to participate were voluntarily excluded. The institutional ethics committee of Government Kilpauk Medical College, approved the study and written informed consent of all participants was obtained. During initial visit relevant details and history regarding the patients are collected like age, duration of diabetes, medications, pregnancy, history of hospitalization, catheterisation, surgery, history pertaining to urinary symptoms and gynaecological infections like dysuria, frequency of micturition, history of white discharge of pruritis vulva. Relevant investigations like fasting and post prandial sugar, urine analysis, urine culture and sensitivity, renal function tests, ultra sound for PVR, urine microalbuminuria, screening for diabetic retinopathy and neuropathy were carried out (Questionnaire attached)

Sample size

Sample size was calculated based on assuming alpha error of 5%. Power of 80, prevalence of ASB in Diabetics is 18%. We recruited 90 diabetics (<45years) and 90 age matched non-diabetics.

Case definition of Diabetes Mellitus

Any patient who is on hypoglycaemic agents / insulin was considered to be diabetic or any subject fulfilling the ADA criteria for diabetes[14]. Fasting ≥ 126 mg/decilitre or 2 hours post prandial sugars ≥200 mg / decilitre or Symptoms of diabetes plus random blood sugar ≥ 200 mg / decilitre[15].

Body Mass Index

a. Underweight if BMI < 18 kg/m2

b.Normal If BMI was between 19 & 24 kg/m2

c. Overweight BMI was between 25 & 29 kg/m2

d. Obese if BMI was more than 30 kg/m2

Peripheral Neuropathy

Presence of at least 4 of the following symptoms: Pain, burning, pricking, numbness, or tingling sensations in the feet, disturbances in pinprick or light touch sense of foot abnormalities.

Nephropathy

Microalbuminuria was present if the urine microalbumin was between 30 and 300 microgm/mg of creatinine or 30- 300 mg/day in a 24 hour urine collection. macroproteinuria. If urine microalbumin >300 micro gm/mg of creatinine or 24 hour urine protein was more than 500mg/24 hours.

Retinopathy: Present or absent as confirmed by an Ophthalmologist .The diagnosis was made in the presence of microaneurysms, dot and blot hemorrhages and evidence of clinically significant macular edema, or any patient who had LASER/ intervention for retinal detachment/ vitreous hemorrhage.

Cardiovascular disease: Any of the following features were taken:

a) Past history of acute coronary syndrome

b) Stable angina

c) History of PTCA/ Coronary artery bypass grafting

d) Tread Mill Test (TMT) positivity

Cerebrovascular disease: Any of the following features:

a) History of transient ischemic attack/ stroke

b) Carotid stenosis- either carotid bruit or Doppler proven

Peripheral vascular disease: Any of the following features:

a) Absent peripheral pulses

b) Claudication pain

c) History of gangrene/ amputation

Renovascular disease: Any of the following features:

a) Renal bruit

b) Doppler evidence of renal artery stenosis

Obstructive uropathy/cystopathy: This was defined as per the standard urologic terminology of the International Continence Society guidelines. Abnormal post void residual urine was defined as PVR more than 10% of the voided volume measured by ultrasound.

Asymptomatic bacteriuria: Defined as the presence of at least 10^5 colony forming units /ml of 1 or 2 of the same microorganism in a culture of clean voided midstream urine from a patient without fever or a symptoms of a urinary tract infection

Statistics

Descriptive statistics was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

Results

Participants in the study population were <45 years with ASB+ve group (mean=37.00) and ASB -ve group (mean=36.83). ASB+ve majority were females (84.21%), males(15.79%) when compared

to ASB-ve group. BMI distribution between ASB +ve group (mean=27.28, SD=3.48) and ASB -ve group (mean=26.24, SD=3.85) was not significant. There was a statistically significant difference in relation to duration of diabetes distribution between ASB +ve group (mean=7.05, SD=3.03) and ASB -ve group (mean=3.61, SD=2.52). No difference in relation to treatment status between ASB +ve group (majority were on OHA – 68.42%)) and ASB -ve group (majority were on OHA – 84.51%). No difference in relation to peripheral neuropathy and autonomic neuropathy between ASB +ve group and ASB -ve group. There was a statistically significant difference in relation to diabetic retinopathy status between ASB +ve group (majority had diabetic retinopathy – 68.42%) and ASB -ve group (majority had no diabetic retinopathy – 60.56%). No statistically significant difference in relation to IHD, CVD, PVD, microalbuminuria, Post void urine between ASB +ve group and ASB -ve group. here was a statistically significant difference in relation to FBS, PPBS, HbA1C distribution between ASB +ve group and ASB -ve group. No statistically significant difference in relation to blood urea and serum creatinine distribution between ASB +ve group and ASB -ve group (Table 1).

Table 1 Risk Factors and their Distribution in cases

RISK FACTOR	ASB+ve %	ASB-ve %	p-value
AGE	37.00	36.83	0.9076
GENDER(M)	15.79	40.85	0.0427
GENDER(F)	84.21	59.15	
BMI	27.28	26.24	0.2855
DURATION (yrs)	7.05	3.61	<0.0001
TREATMENT(OHA)	68.42	84.51	0.111
(OHA+INSULIN)	31.58	15.49	
PERIPHERAL NEUROPATHY	31.58	30.99	0.9604
AUTONOMIC NEUROPATHY	5.26	1.14	0.3113
DIABETIC RETINOPATHY	68.42	39.44	0.0204
IHD	31.58	8.45	0.1284
CVD	0.00	0.00	>0.9999
PVD	5.26	1.14	0.3113
MICROALBUMINURIA(Absent)	31.58	54.93	0.0706
MICROALBUMINURIA(Present)	68.42	45.07	
PVR(<50mL)	78.95	77.46	0.8904
PVR(>50mL)	21.05	22.54	
FBS	225.61	156.96	0.0075
PPBS	266.26	231.41	0.0149
HbA1C	9.45	8.63	0.0075
UREA	37.79	37.10	0.5313
CREATININE	1.27	1.16	0.1224

Discussion

In this study we conclude that a significant increase in female gender status is associated with ASB positivity compared to ASB negativity among our study subjects belonging to cases group without features of lower UTI. In other words ASB positive patients had 1.42 times more female representation compared to ASB negative patients among our study subjects belonging to cases group without features of lower UTI. There was no statistically significant difference in relation to age distribution between ASB +ve group (mean=37.00, SD=5.63) and ASB -ve group (mean=36.83, SD=5.62) with a p value of <0.05 as per unpaired t test. The mean duration of diabetes was significantly more in ASB +ve group compared to ASB -ve group by a mean difference of 3.44 years (49% higher). This difference is significant with a p-value of <0.0001 as per unpaired t test. Among the study patients, there was no statistically significant difference in relation to treatment status between ASB +ve group (majority were on OHA – 68.42%) and ASB -ve group (majority were on OHA – 84.51%) with a p value of <0.05 as per chi squared test. Among the study patients, there was a statistically significant difference in relation to diabetic retinopathy status between ASB +ve group (majority had diabetic retinopathy – 68.42%) and ASB -ve group (majority had no diabetic retinopathy – 60.56%) with a p value of <0.05 as per chi squared test. There was no statistically significant difference in relation to IHD, CVD and PVD between ASB +ve group and ASB -ve group with a p value of <0.05 as per chi squared test. There was no statistically significant difference in relation to ECHO findings between ASB +ve

group and ASB -ve group with a p value of <0.05 as per chi squared test. There was no statistically significant difference in relation to microalbuminuria status between ASB +ve group and ASB -ve group with a p value of <0.05 as per chi squared test. There was no statistically significant difference in relation to USG diagnosis status between ASB +ve group and ASB -ve group with a p value of <0.05 as per chi squared test. There was no statistically significant difference in relation to post void urine status between ASB +ve group and ASB -ve group with a p value of <0.05 as per chi squared test. The mean fasting blood sugar was significantly more in ASB +ve group compared to ASB -ve group by a mean difference of 68.65 mg/dl (30% higher).This difference is significant with a p-value of 0.0075 as per unpaired t test. The mean post prandial blood sugar was significantly more in ASB +ve group compared to ASB -ve group by a mean difference of 34.85 mg/dl (13% higher). This difference is significant with a p-value of 0.0149 as per unpaired t test. The mean HBA1C was significantly more in ASB +ve group compared to ASB -ve group by a mean difference of 0.82% (9% higher). This difference is significant with a p-value of 0.0075 as per unpaired t test. There was no statistically significant difference in relation to blood urea and serum creatinine distribution between ASB +ve group and ASB -ve group with a p value of <0.05 as per chi squared test.

Conclusion

1) Asymptomatic bacteriuria is a common finding in adults and diabetic patients, especially women have more prevalence than men.
2) In our study the prevalence of Asymptomatic bacteriuria in diabetic patients ≤45 years is 21.1%
3) There was no significant correlation between Asymptomatic bacteriuria and post void residual urine.
4) There was significant association between Asymptomatic bacteriuria and retinopathy.
5) There was no association between Asymptomatic bacteriuria and peripheral neuropathy, IHD, CAD, peripheral vascular disease and nephropathy.
6) There was significant association between poor glycemic control, duration of diabetes and Asymptomatic bacteriuria signifying the importance of metabolic control**.**

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Conflict of interest

All authors contributed equally in developing the manuscript.

References

1. HARRISON'S PRINCIPLES OF INTERNAL MEDICINE 19th Edition page2399,2429,
2. Stapleton A. Urinary tract infections in patients with diabetes. Am J Med 2002;113(suppl 1A):80S–4S
3. Valerius NH, Eff C, Hansen NE, et al. Neutrophil and lymphocyte function in patients with diabetes mellitus. Acta Med Scand 1982;211:463–7
4. Hosking DJ, Bennett T, Hampton JR. Diabetic autonomic neuropathy. Diabetes Care 1978;27:1043–54
5. Risk of Urinary Tract Infection and Asymptomatic Bacteriuria among Diabetic and Nondiabetic Postmenopausal Women – Edward J. Boyko1,2, Stephan D. Fihn2,3, Delia Scholes4,5, Linn Abraham 5, and Barbara Monsey5 – Feburary 2, 2004
6. Osterby Hansen R: Bacteriuria in diabetic and non-diabetic out-patients. Acta Med Scand 176:721-730, 1964

7. Schmitt JK, Fawcett CJ, Gullickson G: Asymptomatic bacteriuria and hemoglobin A1. Diabetes Care 9:518-520, 1986
8. Keane EM, Boyko EJ, Barth Reller L, Hamman RF: Prevalence of asymptomatic bacteriuria in subjects with NIDDM in San Luis Valley of Colorado. Diabetes Care 11:708-712, 1988
9. Perez Luque EL, de la Luz Villalpando M, Malacara JM: Association of sexual activity and bacteriuria in women with non-insulin-dependent diabetes mellitus. J Diabetes Complications 6:254-257, 1992
10. Sawers JS, Todd WA, Kellett HA, Miles RS, Allan PL, Ewing DJ, Clarke BF: Bacteriuria and autonomic nerve function in diabetic women. Diabetes Care 9:460-464, 1986
11. Vejlsgaard R: Studies on urinary infection in diabetics. II. Significant bacteriuria in relation to long-term diabetic manifest-tations. Acta Med Scand 179:183-188, 1966
12. Zhanel GG, Nicolle LE, Harding GKM, Manitoba Diabetic Urinary Infection Study Group: Prevalence of asymptomatic bacteriuria and associated host factors in women with diabetes mellitus. Clin Infect Dis 21:316-322, 1995.
13. Geerlings, SE, Stolk, RP, Camps, MJ, et al. Asymptomatic bacteriuria may be considered a complication in women with diabetes. Diabetes Care 2000; 23:744- 49.