Original Research Article

"A STUDY OF PREVALENCE OF ASYMPTOMATIC BACTERIURIA AND ITS ANTIBIOTIC SENSITIVITY IN TYPE 2 DIABETIC WOMEN"

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ABSTRACT:

Background: Infections in the urinary system may spread rapidly and easily. When there is a lot of glucose in the urine, pathogenic microorganisms grow, & can lead to emphysematous cystitis, pyelonephritis, renal/perinephric abscesses, and renal papillary necrosis, among other complications.

OBJECTIVES:

1. To study the range of species that cause asymptomatic bacteriuria,& their antimicrobial sensitivity patterns.

2. To study the association between ASB and patient status (age, duration of diabetes, complications, etc).

3. Create an algorithm to manage ASB in type 2 diabetic women.

Material & Methods: Study Design: Hospital based cross sectional study. **Study area:** The study was done at department of General Medicine, Subbaiah Institute Of Medical Sciences, Shimoga, Karnataka.**Study Period:**June 2020 – May 2021. **Study population:** Type-2 diabetic women presenting to above age 18 years were included.**Sample size:** 100 cases were included in our study.**Sampling method:** Purposive sampling method.**Study tools and Data collection procedure:**Type-2 diabetic women presenting hospital above age 18 years were included. Purposive sampling was used. Observational study will be done. Subjects were identified either by history of anti-diabetic medication use or by blood sugar levels. Asymptomatic bacteriuria will be determined by clinical features and urine analysis. Subsequently patient will be reviewed till discharge or death.

Results: In the present study glycosuria of grade 1+ was seen in 10% of the cases, 10% had 2+, 80% had 3+ and 80% of the cases did not have any glycosuria.In   cases of ASB, 15.6%

of the cases had 1+, 25% of the cases had 2+ and 59.4% of the cases did not have glucosuria.There was a statistically significant association between glycosuria and ASB.

CONCLUSION:

UTI in asymptomatic patients should not be neglected and follow-up is definitely required to supplement the present findings and to appropriately manage the cases of UTI in diabetic patients. As a complication of diabetes UTI maybe preventable with better glucose control and timely and appropriate management of existing ASB.

Key words: asymptomatic bacteriuria, glucose control, glucosuria and leucocyturia.

INTRODUCTION:

Infections in the urinary system may spread rapidly and easily. When there is a lot of glucose in the urine, pathogenic microorganisms grow, & can lead to emphysematous cystitis, pyelonephritis, renal/perinephric abscesses, and renal papillary necrosis, among other complications.

Urinary tract infections are normally asymptomatic, however clinical infections are rare. It's still unclear how bacteriuria progresses from asymptomatic to symptomatic illness. Women are more likely to be affected & to acquire urinary tract infections that go untreated (UTIs). Risk factors for asymptomatic bacteriuria in diabetic women change with age, diabetes duration, and comorbidities.

Because of the seriousness of the complications associated with urinary tract infections, which are more prevalent in diabetics, and because renal involvement can occur even in the absence of symptoms, it is critical to investigate the link between asymptomatic bacteriuria and symptomatic UTI in women with diabetes (example: subclinical pyelonephritis).

Hence the present study was conducted to find out how common bacteriuria is among women with type-2 diabetes.

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Material & Methods:

Study Design: Hospital based cross sectional study.

Study area: The study was done at department of General Medicine, Subbaiah Institute Of Medical Sciences, Shimoga, Karnataka.

Study Period: June 2020 – May 2021.

Study population: Type-2 diabetic women presenting to hospital above age 18 years were included.

Sample size: 100 cases were included in our study.

Sampling method: Purposive sampling method.

Inclusion Criteria: Adult women having type-II diabetes mellitus who gave voluntary consent were included.

EXCLUSION CRITERIA:
- Those who had one or combination of the following were excluded.
- Symptoms of UTI - including dysuria, frequency, urgency, abdominal discomfort, fever etc.
- Vulvovaginitis
- Pregnancy
- Recent hospitalisation or surgery (<4 months)
- Known urinary tract abnormalities (including cystopathy, etc.)

- Recent urinary tract instrumentation (catheterisation, etc.)
- Culture positive for three or more organisms, funguria
- Use of antimicrobials in the last 14 days
- Past history of UTI
- Hypertension

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure:

Type-2 diabetic women presenting to hospital above age 18 years were included. Purposive sampling was used. Observational study will be done. Subjects were identified either by history of anti-diabetic medication use or by blood sugar levels. Asymptomatic bacteriuria will be determined by clinical features and urine analysis. Subsequently patient will be reviewed till discharge or death.

All subjects interviewed during the first visit of study & medical history was obtained. This information includes age, diabetes duration, medications, and complications of diabetes. The following laboratory data were included: fasting plasma glucose, urea, creatinine, albuminuria, glucosuria and leucocyturia. These patients were evaluated for microvascular and macrovascular complications of diabetes.

Statistical analysis:

Data Entry done using Microsoft excel 2013 and analyzed by SPSS V 16. Qualitative data was expressed in frequencies and percentages and Quantitative data in mean and standard deviation. Non parametric statistics i.e.Chisquare test/ Fishers exact test was used to find the significant association between the two qualitative variables. Unpaired t test and ANOVA was used to find the statistical significance between quantitative variables. Bar diagrams & pie charts were used to represent data. p value of <0.05 considered significant statistically.

OBSERVATIONS & RESULTS:

Table1:PrevalenceofAsymptomaticbacteriuria

	Frequency	Percentage
Yes	32	32%

No	68	68%
Total	100	100%

Table 2: Age incidence of Asymptomatic Bacteriuria

| | Asymptomaticbacteriuria | | | | Total | |
| | Present | | Absent | | | |
	N	%	N	%	N	%
30—40	4	12.5%	14	20.6%	18	18%
41—50	10	31.3%	22	32.4%	32	32%
51—60	8	25.0%	13	19.1%	21	21%
61—70	8	25.0%	15	22.1%	23	23%
71—80	2	6.3%	3	4.4%	5	5%
81—90	0	0.0%	1	1.5%	1	1%
Total	32	100.0%	68	100.0%	100	100%
Chi square test = 1.85 , p=0.86, Not statisticallysignificant						

Table 3: Diabetic remission and bacteriuria in the urine

| | Asymptomaticbacteriuria | | | | Total | |
| | Present | | Absent | | | |
	N	%	N	%	N	%
1—5	9	28.1%	29	42.6%	38	38%
6—10	12	37.5%	23	33.8%	35	35%
11—15	4	12.5%	12	17.6%	16	16%

16–20	6	18.8 %	2	2.9%	8	8%
>20	1	3.1 %	2	2.9%	3	3%
Total	32	100 %	68	100%	100	100 %
Mean± SD	9.28±5.92		7±5.25		7.73±5.55	
Ttest =2.24, p=0.04*, statistically significant						

Table4:BodymassIndex

	Asymptomaticbacteriuria				Total	
	Present		Absent			
	N	%	N	%	N	%
18.6–24.9	13	40.6 %	17	25.0 %	30	30 %
25–29.9	18	56.3 %	34	50.0 %	52	52 %
>30	1	3.1%	17	25.0 %	18	18 %
Total	32	100.0 %	68	100.0 %	100	100%
Mean± SD	25.55±2.01		27.64±3.53		26.97±3.27	
Chisquare test =7.71 , p=0.02*, statistically significant						

Table5:AssociationbetweenGlucosuriaandAsymptomaticbacteriuria

	Asymptomaticbacteriuria				Total	
	Present		Absent			
	N	%	N	%	N	%
1+	5	15.6 %	5	7.4 %	10	10 %

2+	8	25.0 %	2	2.9 %	10	10 %
No	19	59.4 %	61	89.7 %	80	80 %
Total	32	100. 0%	68	100. 0%	100	100%
Chisquaretest=15.12,p=0.001*,statisticallysignificant						

Table 6: Association between Macro albuminuria and asymptomatic bacteriuria

	Asymptomaticbacteriuria				Total	
	Present		Absent			
	N	%	N	%	N	%
Yes	9	28.1 %	8	11.8 %	17	17 %
No	23	71.9 %	60	88.2 %	83	83 %
Total	32	100 %	68	100%	100	100%
Chisquaretest=4.08,p=0.01*,statisticallysignificant						

Table 7: Association between Leukocyturia and Asymptomatic bacteriuria

	Asymptomaticbacteriuria					
	Present		Absent		Total	
	N	%	N	%	N	%
Yes	24	75%	1	1.5 %	25	25 %
No	8	25%	67	98.5 %	75	75 %
Total	32	100 %	68	100 %	100	100 %
Chi square test = 62.11, p=0.0001*, statisticallysignificant						

DISCUSSION:

Urinary Tract Infection (UTI) is caused by pathogenic invasion of the urinary tract which leads to an inflammatory response of the urothelium. Bacterial Proliferation in urinary tract is the cause of urinary tract infection. The clinical manifestations of UTI depend on the portion of urinary system involved, the etiologic organism(s), the severity of the infection and the patient's ability to mount an immune response to it.[1]

Signs and symptoms may include fever, chills, dysuria, urinary urgency, frequency and cloudy or malodorous urine. Infections are almost always ascending in origin and caused by bacteria in the periurethral flora and the distal urethra. These bacteria inhabit the distal GI tract and colonize the perineal area. E. coli usually causes a child's first infection[2] but other gram-negative bacilli and Enterococci may also cause infection. Staphylococcal infections, especially those due to Staphylococcus saprophyticus are common causes of urinary tract infection among female adolescents.[3]

Diabetes mellitus is a metabolic syndrome characterized by an inappropriate elevation of blood glucose as a result of relative or absolute lack of insulin. Diabetes mellitus has a long term effect on genitourinary system and diabetics are more prone to UTIs and particularly to upper urinary tract infections.[4]

Studies show that diabetes affects many systems that protect against infection in general and against urinary tract infections specifically. Poor circulation of blood in diabetes reduces the ability of infection-fighting white blood cells to get to their target site, even when they do get there, they are less able to ingest the offending bacteria and kill them than normal white blood cells. Many diabetics have dysfunctional bladders that contract poorly; this allows urine to remain in static pools for long periods of time,providing luxurious ponds for bacteria to grow in[5]. The high prevalence of UTI among diabetic patients and the evidence of rapid parenchymal involvement emphasize the need for knowledge of the prevalence, clinical awareness of the problem and clarification of its consequences in order to define the magnitude of public health resources required to care for the disease.

UTI is a common problem in diabetes patients. Pyelonephritis, Cystitis, impaired leukocyte function, recurrent vaginitis, emphysematous complications & renal, perinephric abscesses are well recognized in this group, especially with poor glycemic control. Suspecting potential complications & early interventions needed to reduce adverse outcomes. The management of UTI in diabetics is essentially the same as patients without diabetes. During the course of a lifetime with diabetes, UTIs would be ranked among the top ten concurrent or complicating illnesses by most experts and patients.

Inthis study,asymptomaticbacteriuriawasseenin32%ofthesubjects.

Study	PrevalenceofASB
Presentstudy	32%
Nabi Tetal.[6]	39.6%
Gutema Tet al.,[7]	16.7%

YismawGetal.,[8]	17.8%
SibiG etal.,[9]	68%

In this study, 18% of the participants were aged 30-40, 32% were aged 41-50, 21% were aged 51-60, 23% were aged 61-70, 5% were aged 71-80, 1% was aged 81-90 years. Association between age & asymptomatic bacteriuria was not significant statistically. In the study conducted by Sibi G et al.[9], they have observed that female and more vulnerable to get UTI when compared to men. Many of the studies supported that middle aged men are more vulnerable to get UTI.

In our study we have studies occurrence of infections in women. The mean age of the participants in the study conducted by Gutema T et al., [7] were 44 years (±15.6 standard deviation). A large proportion (24.9%) of the participants falls in the age group 35 - 44 years & the male - female ratio was 1:0.85.In the current study, UTI was considered to be higher among diabetic females than males. This was in accordance with previous studies conducted in Debre Tabor, Northwest Ethiopia, United States of America, and Timisoara, Romania. The higher risk of infection in females can be due to that urethra in females is much shorter and very close to the anus, which is a persistent source of fecal bacteria irrespective of DM.

In this study, in 38% of the subjects duration of diabetes was for 1-5 years, 35% of the subjects were diabetic for. Duration of 6-10 years, 16% had diabetes for a duration of 11-15 years, 8% were diabetic for a duration of 16-20 years, and 3% were diabetic for a duration >20 years.Mean diabetes duration among the cases who had asymptomatic bacteriuria was9.28 ± 5.92 years and in cases without bacteriuria it was 7 ± 5.25 years. There was a statistically significant association between diabetes duration & asymptomatic bacteriuria. Occurrence of asymptomatic bacteriuria was significantly higher in cases with longer duration of diabetes. The study conducted byNabi T et al[6]., Gutema T et al.[7], and Yismaw G[8]were also showing consonant result with the present study stating that the duration of diabetes had a highly significant statistical association with ASB.

In this study, the overall, mean BMI observed was 26.97 ± 3.27, 30% had mean BMI between 18.6-24.9, 52% were having BMI of 25-29.9, 18% were having a BMI of>30.The mean BMI among cases with bacteriuria was 25.55 ± 2.01, in cases without bacteriuria it was 27.64 ± 3.53. A significant statistical association was observedbetween BMI and bacteriuria. Cases with bacteriuria were having significantly lower BMI when compared to those who did not.

In the present study glycosuria of grade 1+ was seen in 10% of the cases, 10% had 2+, 80% had 3+ and 80% of the cases did not have any glycosuria.In   cases of ASB, 15.6% of the cases had 1+, 25% of the cases had 2+ and 59.4% of the cases did not have glucosuria.There was a statistically significant association between glycosuria and ASB. The cases with ASB had significantly higher amounts of glycosuria when compared to those who did not. In the present study, microalbuminuria was seen in 17% of the cases. Whereas in cases with ASB, microalbuminuria was seen in 28.1% of the cases and in cases without ASBmicroalbuminuria was seen in 11.8% of the cases.

Overall in this study, 25% of the cases had lecuocuturia. Among the cases with ASB there were 75% cases of leucocyturia, whereas in cases without ASB leucocyturia was present only
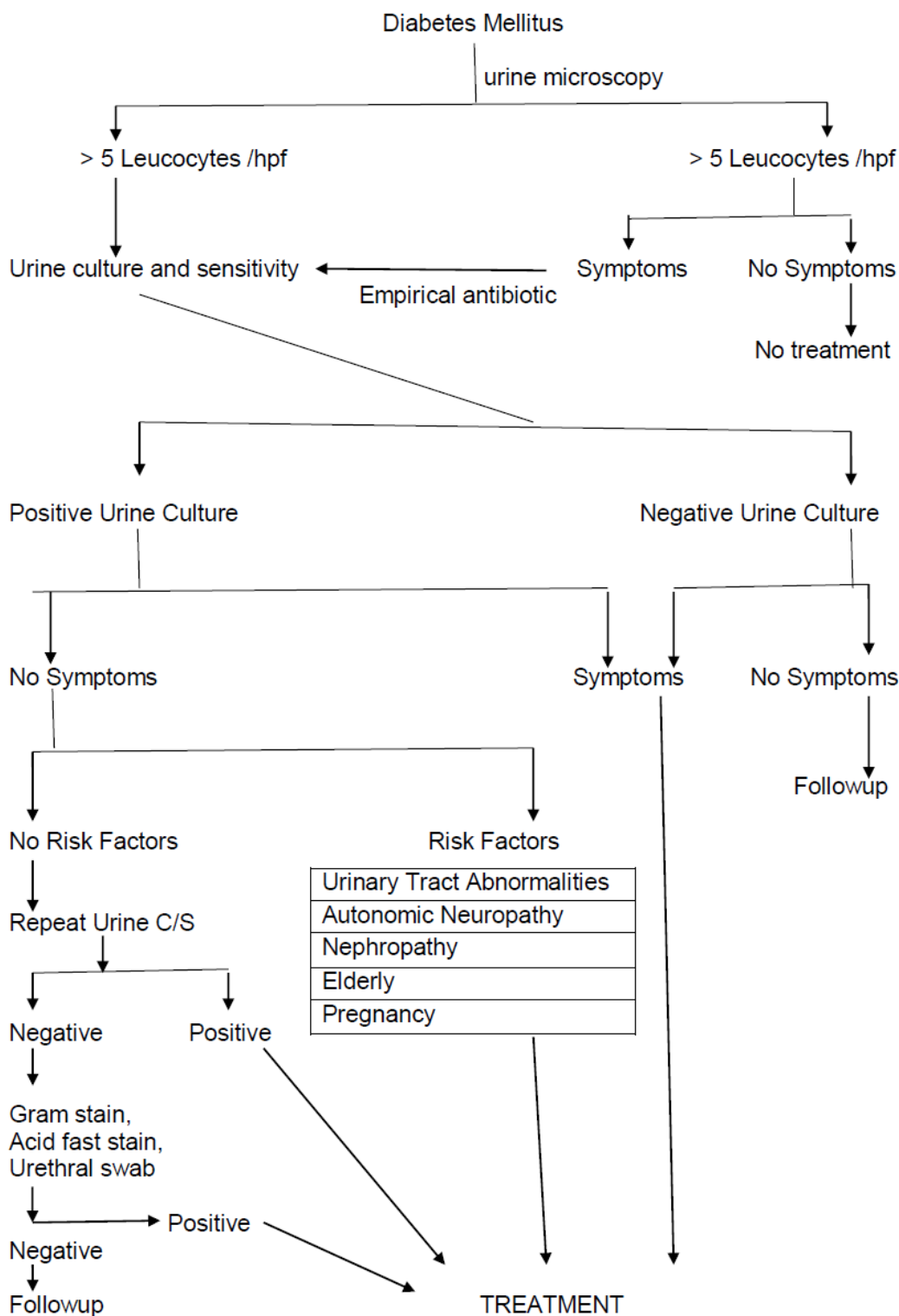
in 1.5% of the cases.This finding was consonant with the observations made in the studies done byNabi T et al[6].,Simkhada T et al[10]., Yismaw G et al[8].

In the study conducted by Nabi T et al[6] Various factors like the presence of CKD, renal calculi, cystopathy, lower eGFR and higher HbA1c were significantly associated with the development of recurrent UTI in female T2D patients. At the same time, age, postmenopausal state, longer diabetes duration and diabetic microvascular complications did not influence recurrence of UTI.

In study conducted by Gutema T et al., [7] uponbivariate logistic regression analysis, they have observed that the variables such as sex, education, history of UTI, current symptoms of UTI, type of diabetes, and history of glucosuria were statistically associated with UTI and similar pattern is observed in the present study.

Yismaw G et al[8]., found that significant bacteriuria associated significantly with history of previous UTI, antibiotic treatment, type of diabetes and blood glucose level.

ALGORITHM TO MANAGE ASB IN TYPE 2 DIABETIC WOMEN

Diabetes Mellitus

urine microscopy

> 5 Leucocytes /hpf   > 5 Leucocytes /hpf

Urine culture and sensitivity ← Empirical antibiotic   Symptoms   No Symptoms

No treatment

Positive Urine Culture   Negative Urine Culture

No Symptoms   Symptoms   No Symptoms

Followup

No Risk Factors   Risk Factors

Repeat Urine C/S

| Urinary Tract Abnormalities |
| Autonomic Neuropathy |
| Nephropathy |
| Elderly |
| Pregnancy |

Negative   Positive

Gram stain,
Acid fast stain,
Urethral swab

→ Positive

Negative

Followup   TREATMENT

CONCLUSION:

UTI in asymptomatic patients should not be neglected and follow-up is definitely required to supplement the present findings and to appropriately manage the cases of UTI in diabetic patients. As a complication of diabetes UTI maybe preventable with better glucose control and timely and appropriate management of existing ASB.

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