

A STUDY ON CLINICAL PROFILE OF URINARY TRACT INFECTION IN DIABETES MELLITUS AND ITS CORRELATION WITH BACTERIOLOGICAL PROFILE IN COIMBATORE MEDICAL COLLEGE AND HOSPITAL, COIMBATORE, TAMIL NADU

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Abstract

Background: Diabetes Mellitus is the disease of Modern Civilisation. Diabetes weakens immune system. Many pathology leads to suppression in immune system which increases the risk of infections. The most common infection is Urinary Tract infection which can be symptomatic or asymptomatic. Aim: The aim of the study is to determine the correlation between clinical and bacteriological profile of urinary tract infection in diabetes mellitus patients and its antibiogram in Coimbatore Medical College and hospital. **Materials and Methods:** This is a cross sectional study done in the Department of Medicine in the Coimbatore Medical College & Hospital, Coimbatore for a period of March 2022 to February 2023. The study participants who fulfilled the inclusion and the exclusion criteria were included in this study. Demographic details like name, age, sex, duration of diabetes mellitus were taken. Laboratory test done for fasting blood sugar, postprandial blood sugar and urine routine were done. The collected data was entered in the MS excel and statistics were done with SPSS 23. Categorical variables expressed in numbers and percentages and continuous variables were expressed in terms of mean and standard deviation. P value <0.05 is considered as significant. **Result:** Among the study participants majority were more than 50 years of age 81%. Female predominance is observed in our study 62%. The most common presentation of Urinary tract infection was fever 61%. E.Coli was the most common organism isolated from the culture. Gram negative organisms are sensitive to meropenem and piptaz whereas resistant to clotrimoxazole. **Conclusion:** UTI is common in females and age more than 50 years. Most of the study participants had diabetic duration more than 5 years. Gram negative organisms were the most common found to be isolated in culture and sensitive to Meropenam and Piptaz. Maintaining blood glucose within normal limits will help in reducing this infection.

INTRODUCTION

Diabetes is a metabolic disease that occurs when the body is not able to use the insulin it produces or when the pancreas is not able to produce sufficient insulin.^[1,2,3] The global prevalence of the Diabetes among the adults of age 18 years has been raised from 4.7% in 1980 to 8.5% in 2014.^[4] Diabetes is a condition which is defined by the level of hyperglycemia which will give rise to microvascular damages like retinopathy, nephropathy and neuropathy. Significant morbidity is noticed in Diabetes which is due to Diabetes related

microvascular complications and increased risk of macrovascular complications. This will interfere with the quality of life of Diabetes diagnosed people.

Diabetic patients have higher risk for infections as they have multiple abnormalities in the immune system. Not only the risk of infection is more in Diabetes mellitus patients, even the course of infection is more complicated than the normal patients. The most common infection which is observed among Diabetic patients is Urinary tract infections. This is because of various impairments in the immune system, poor metabolic control and incomplete bladder emptying due to autonomic neuropathy. It is frequently observed resulting in

significant morbidity and high medical cost. Resistant bacterial flora associated with urinary tract infection is changing from place to place. The choice of antibiotic should be made based on local resistance pattern. Therefore the knowledge of bacterial flora of patients of urinary tract infection of that particular geographical area is required.

Also the spectrum of urinary tract infection varies from asymptomatic bacteriuria to cystitis, pyelonephritis and urosepsis. Asymptomatic bacteriuria itself is a risk factor of pyelonephritis and decline in renal function. Hence treatment of asymptomatic bacteriuria in diabetics is recommended to prevent risk of symptomatic.

Urinary tract infection can be symptomatic or asymptomatic. Symptomatic urinary tract infections characterised by urgency, dysuria and painful frequent voiding, presence of bacteria in the sterile urine. The Asymptomatic bacteriuria is defined as actively and persistently multiplying bacteria in significant numbers i.e 10^5 bacteria per ml within urinary tract without any obvious symptoms. It occurs as a result of interaction of bacterial virulence and host biologic and behavioural factors as opposed to highly efficient host defence mechanisms. The risk of significant bacteriuria seems to be increased 10 fold increase in diabetic patients(5). The general risk factors for urinary tract infection in diabetes mellitus patients are :age, long term complications like primary diabetic nephropathy, cystopathy and poor metabolic control. In microbial perspective, urinary tract infection exist when pathogenic microorganisms are detected in urine, urethra, bladder, kidney, prostate with or without symptoms. Urinary tract infection may involve only lower urinary tract or both upper and lower urinary tract. Urinary tract infection can again be classified as Complicated and uncomplicated. The infection which occurs in structurally and neurologically normal urinary tract is known as Uncomplicated urinary tract infection. The infection in a urinary tract with functional or structural abnormalities including indwelling catheters and calculi is known as complicated urinary tract infection. This study is done to find out the correlation between clinical and bacterial profile of UTI in diabetes mellitus patients.

Aim of the study

To determine the correlation between clinical and bacteriological profile of urinary tract infection in diabetes mellitus patients and its antibiogram in Coimbatore Medical College and hospital.

MATERIALS AND METHODS

Study Setting

This study was conducted in the Department of Medicine, Inpatient ward, Coimbatore Medical College and Hospital. The study was done for a period of one year from March 2022 to February 2023.

Study Design

Cross sectional study

Sample Size

The study participants fulfilling the inclusion and the exclusion criteria were included in the study throughout the study period. The final attained sample is 100.

Inclusion Criteria

All the Diabetes Mellitus patients whose fasting blood glucose value was equal to or more than 126 mg/dl and postprandial blood glucose value more than or equal to 200 mg/dl were included in the study.

Exclusion Criteria

- Age <18 years
- Recently treated patients for urinary tract infection (<2 weeks)
- Pregnancy
- Patients with congenital or acquired defects in the genito-urinary tract
- Patients on treatment with immunosuppressive drugs
- Patients on continuous indwelling catheter.

Data Collection Method:

After obtaining the Institutional Ethical Committee clearance, study was started after obtaining patients consent. The baseline demographic details like patients name, age, sex, duration of diabetes, symptoms were noted. Detailed examination of all symptoms including the temperature, pulse rate, blood pressure, suprapubic tenderness were noted.

Collection of Midstream Urine

Patient were asked to clean the genital region prior to collection of specimen. The males were asked to clean the glans penis with swabs soaked in clean tap water. Then the patient was asked to pass first 50 ml of urine into the toilet and collect the next 5-10ml of urine which is the midstream in a clean sterile bottle. In females were instructed to separate the labia and clean their vulva twice from anteroposterior direction with a swab soaked in tap water and then with a dry swab, before collecting the specimen. While holding the labia still apart the midstream urine was collected in the same way as males.

Statistical Analysis

The obtained data was entered in the MS Excel Windows 10. Statistical analysis was done with the help of SPSS 23. Continuous data was expressed in terms of Mean and Standard deviation .Categorical data was expressed in terms of Numbers and percentages. Test of association for Categorical data was Chi square test and for Continuous data was t test and Anova test.

RESULTS

The most common presentation of the study participants was the fever 61% followed by Burning Micturation 45%. The third common presentation was Abdominal pain 21%.

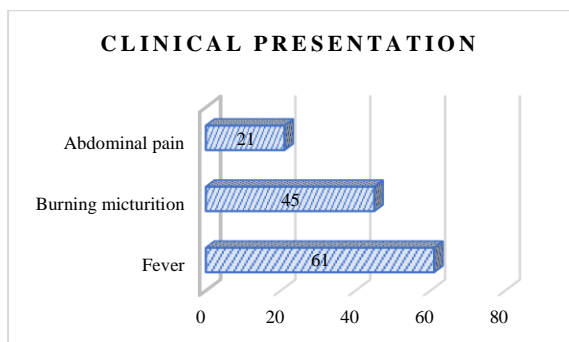


Figure 1: Distribution of the symptoms among study participants

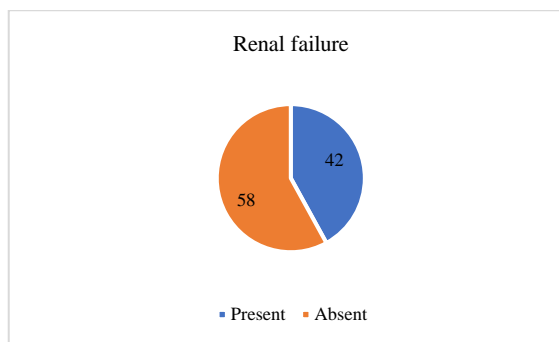


Figure 2: Prevalence of Renal failure

42% of our study participants have renal failure.

Table 1: Demographic characteristics of the study participants

Characteristics	Number(N)/ Percentages(%)
Age	
40-49 years	19
50-59 years	50
60-69 years	30
>70 years	1
Sex	
Male	38
Female	62
Symptoms	
Present	67
Absent	33

The minimum age was found to be 40 years and maximum age was found to be 72 years. Majority of our study participants 50 % were in the age group of 50-59 years, followed by 30% patients in 60-69 years of age .Female predominance is observed in our study 62%.

Table 2: Duration and Laboratory report of Study participants

Diabetes Details		Number (N)/Percentage (%)
Duration of Diabetes Mellitus	<5 yrs	49
	6-10 yrs	42
	>10 yrs	9
Fasting Blood sugar	120-200	18
	201-300	46
	301-400	31
	>400	5
Postprandial Blood Sugar	150-300	22
	300-400	46
	400-500	26
	>500	6
Urine sugar	Trace	8
	1+	26
	2+	51
	3+	15
Urine protein	Nil	5
	Trace	30
	1+	39
	2+	26

Most of the study participants had Diabetes for <5 years 49%. Fasting Blood sugar 201-300 was seen in majority of the study participants 46% followed by 31 % of patients with 301-400 mg/dl.46% of the study participants have postprandial blood sugar 300-400.51% of the study participants have 2+ urine sugar and 39% of them have 1+ urine protein.

Table 3: Organisms found on culture

Organisms	Number (N)/Percentage(%)
E.Coli	70
Klebsiella	23
Pseudomonas	3
Enterococcus	2
Proteus	2

The most common organism found in the culture was E.Coli 70% followed by Klebsiella 23%

Table 4: USG abdomen findings(N=100)

USG Abdomen	Number /Percentages
Normal	33
Cystitis	58
Pyelonephritis	9

Among the study participants nearly 58% had cystitis and 9% had pyelonephritis.33% had a normal ultrasound findings.

Table 5: Organisms in Renal failure

Organisms	Renal Failure	
	Present	Absent
E.Coli	30	40
Klebsiella	9	14
Pseudomonas	2	1
Enterococcus	1	1
Proteus	0	2
Total	42	58

E.Coli is the most common organism 30% to be present in Renal failure patients followed by Klebsiella 9%.

Table 6: Drug sensitivity of the organisms

Drug	E.Coli (N=70)		Klebsiella (N=23)		Pseudomonas (N=3)		Enterococcus (N=2)		Proteus (N=2)	
	S	R	S	R	S	R	S	R	S	R
Ceftriaxone	59	11	19	4	1	2	0	2	1	1
Ampicillin	26	44	2	21	0	3	2	0	0	2
Ciprofloxacin	46	24	14	9	1	2	1	1	0	2
Cotrimoxazole	26	44	11	12	1	2	0	2	0	2
Amikacin	61	9	21	2	2	1	1	1	1	1
Piptaz	66	4	21	2	2	1	1	1	1	1
Meropenam	70	0	23	0	3	0	1	1	2	0
Gentamicin	60	10	21	2	1	2	1	1	1	1
Norfloxacin	53	17	15	8	1	2	0	2	1	1
Nitrofurantoin	60	10	12	11	3	0	2	0	1	1

Table 7: Drug sensitivity All organisms

Drug	Drug Sensitivity				
	E.Coli (N=70)	Klebsiella (N=23)	Pseudomonas (N=3)	Enterococcus (N=2)	Proteus (N=2)
Ceftriaxone	84%	82%	33%	0%	50%
Ampicillin	37%	9%	0%	100%	0%
Ciprofloxacin	65%	61%	33%	50%	0%
Cotrimoxazole	37%	48%	33%	0%	0%
Amikacin	87%	91%	66%	50%	50%
Piptaz	94%	91%	66%	50%	50%
Meropenam	100%	100%	100%	50%	100%
Gentamicin	85%	91%	33%	50%	50%
Norfloxacin	75%	65%	33%	0%	50%
Nitrofurantoin	85%	52%	100%	100%	50%

Table 8: Drug resistance of all organisms

Drug	Drug Resistance				
	E. Coli (N=70)	Klebsiella (N=23)	Pseudomonas (N=3)	Enterococcus(N=2)	Proteus (N=2)
Ceftriaxone	16%	18%	67%	100%	50%
Ampicillin	63%	91%	100%	0%	100%
Ciprofloxacin	35%	39%	67%	50%	100%
Cotrimoxazole	63%	52%	67%	100%	100%
Amikacin	13%	9%	34%	50%	50%
Piptaz	6%	9%	34%	50%	50%
Meropenam	0%	0%	0%	50%	0%
Gentamicin	15%	9%	67%	50%	50%
Norfloxacin	25%	35%	67%	100%	50%
Nitrofurantoin	15%	48%	0%	0%	50%

DISCUSSION

In our study majority of the study participants have urinary tract infection in more than 50 years of age. Female preponderance was also seen in our study 62%. Dr. Tushar P et al^[6] study also showed similar results. Majority of the study participants in that study was above 50 years and females were more. The most common presentation was fever 61% followed by Burning Micturition 45% in our study. Similar results was also seen in Dr. Tushar P et al study where fever was the common presentation followed by dysuria. In our study majority of the study participants had Diabetes Mellitus for more than 5 years. Also in the study done by Netherland Gorter K et al^[7] had stated that recurrent UTI was common in patients whose diabetes was more than 5 years. 39% of our study participants have reported 1+ proteinuria and 30% has trace. This implies that the patients with urinary tract infections had proteinuria. This is also seen in Sandberg et al study where urinary tract infection is found to be associated with proteinuria.

Patterson J et al⁽⁸⁾ had stated that the diabetic patients with UTI found in older age, duration of diabetes mellitus and level of control are the risk factors for UTI. In our study the most common organism isolated was E. Coli 70%. Similar results was also seen in Dr. Tushar P et al study. Baqai R et al also done a study among 100 Diabetic patients and found E. Coli in 50% followed by S. Aureus. 20%. Gram negative organisms was the most common found in our study. Meropenam, Piptaz, Amikacin, Ceftriaxone are the drugs sensitive to gram negative organisms. Majority gram negative organisms was resistant to ampicillin, Ciprofloxacin and Clotrimoxazole. Similar results was also seen in Dr. Tushar et al study where the gram negative organisms were sensitive for Piperacillin, imipenem, cefotaxime. Geerlings S stated in her study that higher percentage of resistance was seen in amoxicillin, nitrofurantoin, ciprofloxacin in diabetes patients.

Limitations of the study

The sample size is small. Our study was done in a tertiary care centre which is a small geographical area.

CONCLUSION

It is concluded from our study that, urinary tract infection in Diabetes mellitus seen commonly in study participants more than 50 years of age and among females. Fever is the most common symptom and majority had diabetic duration > 5 years. Asymptomatic bacteriuria is the major risk factor for

urinary tract infections. Patients with glycosuria and proteinuria had more incidence of urinary tract infections. Gram negative organisms were more in culture. E.Coli was the most common isolated organism both in symptomatic and asymptomatic patients. They were sensitive to Ceftriaxone, Piperacillin, Tazobactam, Meropenam and Amikacin. Poor glycemic index was found to be more significantly associated with more number of pus cells in urine.

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Competing interest

There is no Competing interest

Authors contribution

All authors in our study contributed to the data collection of the patients

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