Original research article

Urinary Tract Infection In Patients With Diabetes Mellitus And Prostatomegaly

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Abstract

In 1985, there were 30 million instances of diabetes worldwide; in 2013, there were 382 million. This represents a startling increase in the disease's prevalence over the preceding two decades. In diabetics, infections pose a special risk because of their weakened immune systems. Lower urinary tract symptoms are most frequently caused by benign prostatic hyperplasia and benign prostatic enlargement, which are two of the most prevalent conditions found in males over the age of 60.
Keywords: Diabetes mellitus, prostatomegaly, UTI, bacteriuria, HbA1c

Introduction

According to data from 2013, India is home to more than 65.1 million individuals living with diabetes, which is an alarming increase from the country's total of 50.8 million people living with the condition in 2010. The rapid rise in the prevalence of diabetes and diabetes-related complications in India that has accompanied the country's resurgence as an economic powerhouse is not without unintended consequences. In certain cities, the prevalence rate is as high as twenty percent, while recent statistics showed a startlingly high prevalence rate in rural areas [1]. Patients with diabetes face a heightened risk of infection from their condition. Foot infections, infections at surgical sites, and urinary tract infections are especially common in diabetics (UTI). According to a number of studies, diabetics have a lower chance of survival when they contract infections. Patients who are admitted to hospitals do not have an increased risk of death; nonetheless, they often spend more time in the hospital and take longer to recover [2]. Benign prostatic hyperplasia (BPH) and benign prostatic enlargement (BPE) are two of the most prevalent disorders that affect older men and can cause symptoms in the lower urinary system. BPH and BPE are abbreviated as "BPH" and "BPE", respectively (LUTS). However, the connection between BPH, BPE and LUTS is a complicated one due to the fact that not all men who have BPE go on to acquire LUTS and not all men who have LUTS have BPE [3]. It is unavoidable that this condition will grow even more widespread and provide a significant obstacle for all health care systems in the future as a result of shifting demographic patterns and an ageing population that is becoming more prominent in practically all countries in the world. Because of the enlarged prostate, the urethra becomes compressed, which plays a key role in the development of bladder dysfunction and LUTS. When the bladder is compressed to the point where it is pushed to hypertrophy and enhance its own

contractile force, the wall of the bladder becomes thicker, trabeculated and irritable [4]. A urinary tract infection (UTI) can be asymptomatic (a subclinical infection) or symptomatic (a disease). The term "UTI" refers to a variety of clinical entities, such as asymptomatic bacteriuria (ABU), cystitis, prostatitis and pyelonephritis. UTIs can be either subclinical infections or full-blown diseases. In the days before antibiotics, urinary tract infections were a major cause of morbidity. An UTI is a bacterial or nonbacterial invasion of the urinary tract, and it can happen anywhere between the urethra and the kidney. This indicates that UTIs can happen anywhere in the urinary tract. Upper and lower tract infections are the two categories that can be used to classify urinary tract infections (UTIs) [5]. UTIs of the lower tract include conditions such as prostatitis, epididymitis, cystitis, and urethritis, whereas UTIs of the upper tract include conditions such as pyelitis and pyelonephritis. Infection that is localised to the renal pelvis is referred to as pyelitis, while pyelonephritis refers to an infection that affects both the kidney and the pelvis. Both males and females have the same physical structures that are affected by infections of the upper urinary tract. The phrase "substantial bacteriuria" is occasionally used to indicate that the number exceeds that which might be generated by contamination while collecting the specimen. This is done so because the term "significant bacteriuria" is sometimes used [6].

Materials and Methods

The study was conducted in the Dept. of Urology of Govt Stanley Medical College, Chennai for a period of 1 year from June 2015 to July 2016. Patients of age group >30 years, a detailed history was obtained after taking consent from the patient, with particular reference to the duration and type of diabetes, treatment taken and adherence, symptoms related to diabetes and its complications. This was done after obtaining consent from the patient.

It was noted that the patient had a history of UTI symptoms such as burning during micturition, frequency, urgency, dysuria, suprapubic pain, and blood in the urine. It was also noted that the patient had any symptoms suggestive of acute pyelonephritis such as fever, chills, nausea, vomiting, and diarrhoea.

In addition, questions were asked about any previous instrumentation or catheterization of the urinary system.

A comprehensive assessment of all of the body's systems was performed, with particular attention paid to the patient's temperature, pulse rate, blood pressure, suprapubic tenderness, costovertebral angle tenderness, and tenderness/mass on deep abdominal probing.

1. **Ultrasonography:** USG was performed in the radiology department by a senior radiologist using a 3.5 MW Mechanical Probe USG machine for radiological diagnosis of various pathological conditions causing prostatic hypertrophy (such as BPH, prostatic abscess, prostatitis, etc.) with special emphasis on radiological grading of prostatomegaly, pyelonephritis [particulate matter in the collecting system, reduced areas of cortical vascular.

2. Urine samples were taken in the middle of the stream as directed by the procedure. In each individual case, a standard urine analysis and culture sensitivity test were performed.

Patients who had sterile pyuria and had radiological and clinical signs of genitourinary tuberculosis (such as thickened walls of the bladder and ureter, multifocal strictures and hydronephrosis, mural thickening and enhancement.) were screened for mycobacterium tuberculosis in their urine using DNA PCR.

Other tests that were performed include a fasting blood sugar (FBS) test, a postprandial blood sugar (PPBS) test, a haemoglobin A1C test, a complete blood count test, a serum

creatinine test, and so on.

Statistical methods

The gathered data was entered into SPSS version 17.0 software, where it was tabulated and collated for statistical analysis using descriptive statistics. The presentation of continuous variables was done as mean standard deviation, whereas the presentation of categorical variables was done as frequencies and percentages.

The Chi-squared test or Fisher's exact test, depending on the circumstances, was utilised to compare the nominal categorical data between the groups. When p was less than 0.05, statistical significance was assumed.

Results

- In the present study 46 patients were of type 2 variety and the remaining 4 were type 1.
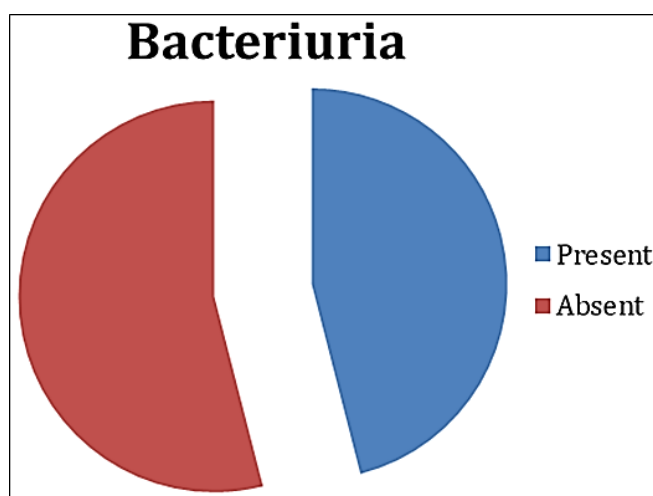
Table 1: Presence of Bacteriuria

Table 1: Age Distribution

Age Distribution	Bacteriuria Present	Bacteriuria Absent
>50 years	20	21
<50 years	3	6

Table 2: Diabetes Profile

	Bacteriuria Present	Bacteriuria Absent	P-Value
HbA1C			
<7%	4	14	0.017
>7%	19	13	
Fasting blood sugar			
<200 mg/dl	7	6	0.536
>200 mg/dl	16	21	
Post prandial sugar			
<250 mg/dl	5	10	0.349
>250 mg/dl	18	17	
Post void residual volume			
>150 ml	21	16	0.011
<150 ml	2	11	

Size of prostate			
>40 cc	19	14	0.035
< 40 cc	4	13	

Table 3: Culture and Sensitivity

Micro organism	IE	CPM	AMC	CIPRO	AMIKA	GENTA	°LEV	NT
E. coli (13)	13	09	07	07	08	08	04	08
Klebsiella (04)	03	-	-	03	01	03	-	-
Proteus (02)	02	-	-	02	03	03	-	-
Enterococci (02)	02	-	0	02	02	02	-	02
Pseudomonas (01)	01	-	-	01	01	01	-	-
Staphylococci (01)	01	-	-	01	-	-	01	-

Discussion

In diabetic individuals who had prostatectomy, the researchers investigated potential risk factors for urinary tract infections (UTIs) in general and bacteriuria in particular. Especially in the north eastern area of India, there is a dearth of research that has a study profile and characteristics that are comparable to one another.

Because research was conducted in a hospital, it is difficult to determine the true prevalence and incidence of urinary tract infections in individuals who had diabetes and prostate enlargement. Due to the fact that asymptomatic bacteriuria in the general population is difficult to identify, the incidence of bacteriuria differed substantially amongst the various studies that were carried out in the past. In the current investigation, a diagnosis of diabetes prostatomegaly with UTI was made for each of the 50 patients who were indoors. In a study that was conducted in the same manner, Chaudhary BL *et al*. 2014 [7] discovered that the prevalence of bacteriuria was 32%, whereas Huvos *et al*. 1959 [8] discovered that the prevalence was 26%.

According to the findings of Ross C 2012 [9] and Vesely S *et al*. 2003 [10], prostatomegaly was prevalent in the age range of 45-71 years and 45-91 years, respectively, in their respective datasets. Additionally, the size of the prostate (greater than 40 cc) was found to be a major risk factor in the present investigation. Ross C9 2012 and Vesely S *et al*. 2003 [10] came to the same conclusions regarding the results.

The current investigation could not uncover any connection between the different types of diabetes and the bacteriuria risk. When patients who had UTIs and diabetes were compared on the basis of the type of diabetes, the researchers Geerlings SE 2008 [11] and Yismaw G & Asrat 2012 [12] did not find any statistically significant differences between the two groups. This finding was in agreement with their findings.

The current study found a favourable association between the length of time someone has had diabetes (greater than six years) and the likelihood that they had bacteriuria. This study was quite similar to those conducted by Yismaw and Asrat 2012 [12] and Gorter KJ *et al*. 2010 [13], both of which found that having diabetes for more than 5 years was a risk factor for bacteriuria UTI. However, Hamdan HZ *et al*. 2015 [14] did not identify any correlation between the length of time someone has diabetes and a bacteriuria UTI.

According to the findings of this particular study, diabetic patients who utilised insulin

as a treatment method were more likely to acquire bacteriuria UTI.

Both Al-Rubeaan KA *et al*. 2012 [15] in Saudi Arabia and Boyko EJ *et al*. 2005 [16] in the USA noted an increased incidence of bacteriuria UTI in patients taking insulin as a treatment modality. This was in comparison to patients taking oral antidiabetic agents and those who were on lifestyle modification. [With odds ratio and 95% CI 4.69 and (4.28-5.14)]

In the current research, non-compliance with therapy was found to be a risk factor for bacteriuria urinary tract infection (UTI). There were no studies that could be located to support this result.

Both the Brauner, A *et al*. study from 1993 and the Papazafiropoulou A *et al*. study from 2010 came to the conclusion that there is no significant link between complications of diabetes and bacteriuria UTI. The current investigation did not reveal any connection between diabetes complications such as neuropathy and bacteriuria UTI. In the present investigation, researchers found that patients who had bacteriuria did not have significantly higher leucocytosis rates than patients who did not have bacteriuria. In their research done in 2002, Nancy C. McGuire and her colleagues observed comparable outcomes in diabetic dogs. There haven't been any studies done on humans that are comparable to this one, comparing diabetics with and without bacteriuria.

In the current investigation, a high prevalence of bacteriuria was seen among diabetic patients whose HbA1c levels were greater than 7%. A positive link was discovered between high levels of HbA1c and an increased risk of bacteriuria UTI by Srinivas A20 in 2014 [the mean HbA1c in diabetics with recurrent UTI was 9.26 3.83 (i.e. > 8.0)]. Similar findings were obtained by Bonadio M *et al*. in 2001 [21], who discovered a significant correlation when HbA1c was greater than or equal to 7% (mean HbA1c 9.2% 1.9%).

Post prandial sugar levels (>250 mg/dl) and fasting sugar levels (>200 mg/dl) were high in 68% and 76% of UTI patients regardless of the presence or absence of bacteriuria; however, this factor was not shown to influence the prevalence of bacteriuria in the diabetic population in the present investigation. In a study that was carried out in Nepal, Simkhada R22 2013 discovered that there was no significant correlation between the degree of sugar control and the growth of the organism, with p values of 0.055 and 0.16 for fasting and PP, respectively. This finding supports the findings of the present study.

In the current research, the presence of bacteriuria was found to have a statistically significant correlation with an elevated PVR. According to research published in 2011 by Simsir A. *et al*. [23], there is a statistically significant correlation between the incidence of bacteriuria and an increased post-void residual volume of more than 150 ml (P 0.0001). Ellenberg M [24] observed a rise in the frequency of UTIs with an increase in urine bladder residual volume in 1980, however Boyko EJ *et al*. 2005 [16] could not find any association between bacteriuria UTI and PVR in their research.

E. coli was found to be the most prevalent of the bacteria that were isolated (n = 13), followed by Klebsiella (n = 4). The research that was conducted by Bonadio M *et al*. in 2006 [21] indicated that diabetes individuals who had bacteriuria had an increased incidence of E-coli of 54.1%, with Enterococcus spp. being the next prevalent pathogen at 8.3%.

E. coli and streptococcus faecalis were found to be the most prevalent uropathogens, according to O'Sullivan *et al*. 251951's research. Studies conducted by Shah B.V *et al*. in 1948, Zhanel *et al*. in 1991, and Huvos *et al*. in 1959 produced results that were comparable to those found in this study.

Conclusion

Uncontrolled blood sugars for a longer period of time, as evidenced by HbA1c levels of more than 7% in diabetic patients and post voidal residual levels of more than 150 ml, did reveal an increased tendency for the development of bacteriuria urinary tract infections.

It does not appear that the type of diabetes or the complications associated with diabetes have any bearing on the likelihood of developing bacteriuria UT.

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