Bacteriological and Clinical Study of Patients with Benign Prostatic Hyperplasia and Urinary Tract Infection

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Abstract
The study included (150) patients with benign prostatic hyperplasia and or chronic prostatitis who referred Al-Hilla Teaching Hospital-Department of Urology, from (October) 2004 to (May) 2005.
Patients age ranged from (30-99) years with mean age of (63.9) years. It was found that (78%) of them had benign prostatic hyperplasia 13.3% had chronic prostatitis and 8.7% had benign prostatic hyperplasia and chronic prostatitis.
The clinical features were frequency (98%), nocturia (90%), urgency (82%), hesitancy (53%), dysuria (51.3%), poor stream (46.7%), dribbling of urine (22%). Other clinical features were pain (22%) such as supra pubic pain, lower backache, groin and perineal pain.
About (20.7%) of patients had post voiding residual urine, while (10%) had history of catheterization and cystoscopy was done to (4%).
Results of general urine examination were pyuria (54%), red blood cells (20.7%), bacteruria (8%) and (12%) had sterile pyuria with urine culture and sensitivity negative.
Regarding the results of urine cultures in patients with benign prostatic hyperplasia and or chronic prostatitis, (43.3%) had positive culture for bacteria. E.coli was the most common type of bacterial isolates (14.7%), Staphylococcus epidermidis (6%), Klebsiella pneumoniae and Staphylococcus aureus ,each of which represented (4%), Acinetobacter spp. (3.3%), Enterobacter spp. and Pseudomonas aeruginosa represented (2.7%) for each, Proteus mirabilis (2%).

الخلاصة
شملت هذه الدراسة (150) مرضاً يعانون من تضخم البروستات الحاد سواء كان من المرضي أو التهاب الغدد المهرن من راجعوا استشاريًا للجراحة البولية في مستشفى الجراحة التعليمي وكانت أعمارهم تتراوح بين الثلاثينات والتاسعة والستين (30 – 99) سنة منهم، وكان متوسط أعمارهم (63.9) سنة. كان (78%) منهم يعانون من تضخم البروستات الحاد، (13.3%) يعانون من التهاب البروستات الحاد و (8.7%) كان لديهم التهاب البروستات الحاد، أثناء العملية.
من الناحية السريرية، كانت معظم الأعراض التي تعي النزلاء المرضى هي تكجر البول (98%)، نبض البولي (90%)، حرق البولي (82%)، الكامل البولي (51.3%)، ضعف البول (46.7%)، وتقلص البول (22%)، أبرزها، المرضى الذين لديهم صعوبة في تنفيذ عملية تطهير البول، (10%) من النزلاء كان لديهم تاريخ وضع أنبوب بزل الإدرار و (4%) خضعوا للمعالجة لتطهير البول.
وكلما نتجت خصى الإدرار العام في خلايا فضية (54%) وكربيد الدم الحمراء (20.7%)، أما الخلايا البكتيرية فقد تمثلت (8%) في خلايا فضية نظيفة (12%)، الناتجة من الزرع البالغ.
أما بالنسبة لنتائج فحص سوائل البروستات المختصة بطريقة التذكير في خلايا فضية (66.6%) وكربيد الدم الحمراء (12.1%).
فيما يجدر بالذكر أن تدفق الإدرار من المرضى المشتبهين بتضخم البروستات الحاد، (14.7%) و (3.3%) من النزلاء نتائج فحص الدم، و (4%) من الفئات نتائج فحص النزلاء.
K. بنية E. coli (43.3%) معظمها من نوع 6، Staphylococcus epidermidis (14.7%)، باقيها بنفس النسبة، Acinetobacter و Pseudomonas aeruginosa و Enterobacter % (2.7%) من العزلات، باقيها في نتائج فحص الدم.
Introduction

Benign prostatic hyperplasia is a nonmalignant neoplastic process secondary to increased cellular growth and it is the age related disease. The majority of men with BPH present with lower urinary tract symptoms only such as nocturia, frequency, urgency, incomplete bladder emptying, hesitancy, weak stream and straining to void [1, 2].

Elderly men are at risk for UTIs because prostatic enlargement can lead to urinary obstruction and retention, providing an excellent medium for bacterial growth. Zinc antibacterial factor, a bactericidal substance is normally found in prostatic fluid, which declines with age. In older men, prostatic fluid becomes more alkaline. All these factors put older men not only at risk for UTIs but for prostatitis as well [3,4].

This work aimed to:

- To assess bacteriologically and clinically the patients with benign prostatic hyperplasia and or chronic prostatitis.
- To study in vitro antimicrobial sensitivity pattern of bacterial isolates from those patients.

Materials and Methods

One hundred and fifty (150) male patients whose ages ranged between (30-99) years underwent the study, who visited Hilla- teaching Hospital-Department of Urology.

All patients underwent full history and complete physical examination by the urologist. (150) urine samples were collected from those patients. Investigation was sent for general urine examination, urine culture and sensitivity, blood urea, serum creatinine and abdominal ultrasound.

General urine examination, It was done according to[5].

The culture media were prepared and bacterial isolates were identified by using the diagnostic tests according to [6].

Results and Discussion

One hundred and fifty patients aged (30 – 99) years old suffered from lower urinary tract symptoms associated with benign prostatic hyperplasia and or chronic prostatitis. Clinically, this work included three variants of patients(Table 1)

### Table 1 Distribution of patients with benign prostatic hyperplasia and or chronic prostatitis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign prostatic hyperplasia</td>
<td>117</td>
<td>78%</td>
</tr>
<tr>
<td>Chronic prostatitis</td>
<td>20</td>
<td>13.3%</td>
</tr>
<tr>
<td>BPH and chronic prostatitis</td>
<td>13</td>
<td>8.7%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100%</td>
</tr>
</tbody>
</table>

Seventy eight percent of patients were presented with benign prostatic hyperplasia only, while (13.3%) had chronic prostatitis and (8.7%) had both CP and BPH. There was a significant
difference between patients according to diagnosis \((p<0.01)\).

The groups of patients were selected according to age, symptoms, physical examination by urologist and investigation. Usually, BPH patients aged more than 50 years, while chronic prostatitis patients, their ages less than 50 years and both groups presented with lower urinary tract symptoms. Pain such as suprapubic pain, perineal and testicular pain) was presented in those who had chronic prostatitis. Third group of patients aged more than 50 years old and presented with lower urinary tract symptoms associated with pain.

The results of this research agreed with those obtained by [6] and [7] who noticed that the prevalence of BPH was (92.97%) and (86.3%) respectively.

Figure 1 Percentage of ages of patients with benign prostatic hyperplasia and or chronic prostatitis.

The most affected age group presented with benign prostatic hyperplasia was between (50-79) years (77.3%) as in (Figure 3.1). The highly affected age group between (60-69) years old (34%). This correlated with the results of (8) who determined that the prevalence of lower urinary tract symptoms in men whose age was between (40-80) years old suggestive of benign prostatic hyperplasia increased linearly from 3.5% in men in their late 40s to 35% in men in their late 80s.

Furthermore, (9) found that benign prostatic hyperplasia was a common adenomatous hyperplasia of periurethral gland which affected at least 65% of men over 55 years old.

**Urinary tract infection**

Benign prostatic hyperplasia and chronic prostatitis increase the risk for urinary tract infection; in addition, the following factors may predispose to urinary tract infection in (150) study patients (Table 2).
Table 2 Number and percentage of factors predispose to Urinary tract infection in patients with benign hyperplasia and or chronic prostatitis

<table>
<thead>
<tr>
<th>Predisposing factors</th>
<th>No. of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVR*</td>
<td>31</td>
<td>20.7%</td>
</tr>
<tr>
<td>History of catheterization</td>
<td>15</td>
<td>10%</td>
</tr>
<tr>
<td>Cystoscopy</td>
<td>6</td>
<td>4%</td>
</tr>
</tbody>
</table>

PVR* - Post Voiding Residual Urine volume

The post voiding residual urine was found in 20.7%, while 10% had history of catheterization. Cystoscopy was done to 4% of them.

Urinary tract infection is more common in elderly men because of significant residual bladder urine, poor emptying the bladder due to prostatic hyperplasia and increased use of instrumentation [4]. The results of this work agreed with those of [10] who reported that 100% of normal men PVR less than 12ml, also noticed that chronic outflow obstruction associated with prostatic hyperplasia is believed to be accompanied by increasing post void residual urine volumes which demonstrated by ultrasound or catheter in which depending on the degree of urine obstruction, the tension in the detrusor wall rises with increasing bladder volume and varying degrees of urinary retention.

The highest lower urinary tract symptoms associated with (150) study patients were frequency presented in (98%) of patients, nocturia (90%), urgency (82%), hesitancy (53%), dysuria (51.3%), poor stream (46.7%) and dribbling of urine (22%).

Table 3 Number and percentage of symptoms in patients with benign prostatic hyperplasia and or chronic prostatitis

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>147</td>
<td>98%</td>
</tr>
<tr>
<td>Nocturia</td>
<td>125</td>
<td>90%</td>
</tr>
<tr>
<td>Urgency</td>
<td>123</td>
<td>82%</td>
</tr>
<tr>
<td>Hesitancy</td>
<td>80</td>
<td>53%</td>
</tr>
<tr>
<td>Dysuria</td>
<td>77</td>
<td>51.3%</td>
</tr>
<tr>
<td>Poor stream</td>
<td>70</td>
<td>46.7%</td>
</tr>
<tr>
<td>Dribbling of urine</td>
<td>33</td>
<td>22%</td>
</tr>
<tr>
<td>Pain</td>
<td>33</td>
<td>22%</td>
</tr>
</tbody>
</table>

Other symptoms included pain which presented in patients who had chronic prostatitis such as (suprapubic pain, lower backache, groin and perineal pain) in 22% (Table 3).

These results correlated with those of [11] who reported that the important lower urinary tract symptoms in men aged between (40-80) years old are frequency 72.7%, nocturia 72.7%, urgency 30%, and dysuria 76.5%, poor stream 54.5%, dribbling of urine 35%.

Bacterial isolation

Bacterial isolates from urine specimens in patients with benign prostatic hyperplasia and or chronic
prostatitis. The results of (150) urine culture revealed that (65) samples had resulted in positive culture for bacteria 43.3% (Table 3.4). (11)samples showed that the prevalence of urinary tract infection in males increases with age, among ages ranging from (36-65) years old, the prevalence is 20% and in more than 65 years group is 35%. Those infections were almost invariably complicated and related to many causes such as prostatic hyperplasia, chronic prostatitis and catheterization.

In this study, *E. coli* was the most common type of bacterial isolates, since it accounted for 14.7%, followed by *Staphylococcus epidermidis* 6%, *Klebsiella pneumoniae* and *Staphylococcus aureus* which represented 4% for each *Acinetobacter spp.* 3.3%, *Enterobacter* and *Pseudomonas aeruginosa* and each of which represented 2.7%, *Proteus mirabilis* 2%. In addition, *Staphylococcus saprophyticus, Corynebacterium* spp. and *Enterococcus* spp. represented 1.3% each (Table 4).

These results can be compared with the results of [12] who established that complicated UTIs involve a diverse spectrum of microorganisms, but the most common one is *E.coli* which is responsible for more complicated UTIs than any other single organism, it represented approximately (40-55)% of isolates from patients with complicated UTIs. *K. pneumoniae, Enterobacter* spp., *Proteus mirabilis* and *Enterococcus* spp. each one represented (5-10) % of isolates. The remaining was due to *P. aeruginosa* and *Staphylococcus* spp.

In addition, [13] noticed that in a survey of UTI pathogens, the top isolate was *E. coli* (48.6%), *Enterococcus* spp. 13.7%, *Klebsiella* spp. (12%), and *Pseudomonas aeruginosa* (6.2%). These results are to some extent comparable to the results of this study. However, [14] found that the common types of isolates in UTI were *Klebsiella* spp.
**Table 4** Number and percentage of bacterial isolates from urine specimens in patients with benign prostatic hyperplasia and or chronic prostatitis

<table>
<thead>
<tr>
<th>Types of bacterial isolates</th>
<th>No. of isolates</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>22</td>
<td>14.7%</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>Acinetobacter spp.</td>
<td>5</td>
<td>3.3%</td>
</tr>
<tr>
<td>Enterobacter spp.</td>
<td>4</td>
<td>2.7%</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>4</td>
<td>2.7%</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Staphylococcus saprophiticus</td>
<td>2</td>
<td>1.3%</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>2</td>
<td>1.3%</td>
</tr>
<tr>
<td>Corynebacterium spp.</td>
<td>2</td>
<td>1.3%</td>
</tr>
<tr>
<td>Culture positive</td>
<td>65</td>
<td>43.3%</td>
</tr>
<tr>
<td>Culture negative</td>
<td>85</td>
<td>56.7%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100%</td>
</tr>
</tbody>
</table>
Effect of some antibiotics on the bacterial isolates

The effect of some antibiotics on isolated bacteria are listed in (Figure 2).

![Figure 2](image)

Types of antibiotics

**Figure 2** Resistance of bacterial isolates to several antibiotics.

Figure (2) shows that the resistance of isolates to amoxicillin was (73.8%) while to amoxicillin-clavulanic acid was (18.5%). The resistance of isolates to amoxicillin was significantly more than to amoxicillin-clavulanic acid (p<0.05). These results matched those obtained by [12] who pointed that the uropathogens resistance to amoxicillin was as high as to amoxicillin-clavulanic acid. The use of clavulanic acid decreased the resistance of bacteria to β-lactame drugs. The mechanism of this resistance is mostly due to either production of β-lactamases that hydrolyze β-lactame ring which is controlled by plasmid or chromosomal regulation, or lack of penicillin receptors on cell wall and/or alteration in their permeability to β-lactam antibiotics and preventing the uptaking of antibiotics by blocking the pores of outer membrane [14]. In addition, [15] explained that over the past decade the utility of this class of antibiotics for treatment of UTIs and chronic prostatitis decreased due to increasing levels of resistance to β-lactam antibiotics.

Regarding cephalosporins, the resistance of isolates to cephalaxin was significantly higher than to cefotaxim (p<0.05) except *K. pneumoniae*, *P. mirabilis* and Acintobacter, (32.3%) of isolates were resistant to cefotaxim. These results matched those of [16] who reported that more than 2/3 patients with various UTIs were sensitive to cefotaxime, and found that only one isolate of *Enterobacter cloacae* was resistant to cefotaxim. Flouroquinolones resistant isolates especially to ciprofloxacin were (27.7%), these results matched those of [17] who showed that a bacteriological cure rate by ciprofloxacin treatment for UTIs especially for chronic bacterial prostatitis has increased within the recent years.
between (70-80) % higher that the resistance of isolates n TMP-SMX (40-71).

The resistance of isolates to gentamycin and amikacin were (60%) and (7.7%) respectively. Resistance of isolates to amikacin was least compared to other antibiotics, (Figure 2). The resistance of isolates to gentamycin was significantly much higher to amikacin except Enterococcus spp. (p<0.05), (9.1%) of E. coli were resistant to amikacin, while other Enterobacteriaceae, P. aeruginosa, Acinetobacter spp. were significantly sensitive. results are identical with (18) who noticed that the effectiveness of parenteral amikacin in the treatment of UTI which has a good activity against gram-negative uropathogens.

From previous results we can conclude the following:

1-Benign prostatic hyperplasia affects older age men who are more than 50 years old, while chronic prostatitis affect young men less than 50 years, (BPH may hind CP as the same time).

2-Most patients with benign prostatic hyperplasia and chronic prostatitis are presented with LUTS.

3-The bacterial infection is associated with BPH and or CP including E.coli, K.pneumoniae, Enterobacter spp., P.mirabilis, P.aeruginosa, Acinetobacter spp., Staphylococcus spp., Corynebacterium spp., and Enterococcus spp.

4-The isolates have shown multi-resistance to antibiotics and more sensitive antibiotics in the treatment of patients with benign prostatic hyperplasia with chronic prostatitis or CP are amikacin, amoxillin-clavulanic acid and ciprofloxacin respectively.

References
Complicated urinary tract infection: Risk stratification, clinical.