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Original Article

Chronic Bacterial Prostatitis: Current Microbiological Spectrum and Sensitivity Pattern

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Introduction: The incidence of Prostatitis is increasing considerably worldwide. Clinical diagnosis of Prostatitis is mostly based on signs and symptoms. Laboratory diagnosis relay on microscopy culture of expressed prostatic secretion (EPS). Studies regarding bacterial prostatitis are limited in Pakistan. This study determines microbiological profiles and resistance patterns of infecting organisms in prostatitis in a general hospital.
Objective: To determine the bacterial agents and their antibiotic sensitivity pattern from EPS samples of patients presenting symptoms of chronic prostatitis.
Materials and Methods: The cross-sectional study was carried out in the Microbiology department, Abbas Institute of Medical Sciences, Muzaffarabad from January 2015 to March 2016. A total of 298 samples of prostatic secretions from patients suspected with prostatitis were cultured by a semi-quantitative method. The isolated bacteria were identified by colony morphology, Gram's staining, motility and biochemical tests. Antibiotic sensitivity was done according to the CLSI guidelines 2015 by disc diffusion method. WHONET Version 5.6 was used for compilation and calculation of data.
Results: The EPS cultures from patients with chronic Prostatitis, showed n=177/298 (59.4%) culture positivity. Out of all specimens, 108(36.2%) samples yielded no growth and 13 (4.36%) yielded normal meatal flora (S. epidermidis). 177 (59.4%) samples yielded the significant growth. The frequencies of Gram-positive and Gram negative bacteria were 54.8 %(n=97 and 45.2% (n=80), respectively. Methicillin sensitive Staph aureus (MSSA) and Methicillin-resistant Staph aureus (MRSA) were the two leading Gram positive isolates while E coli, Klebsiella and Acinetobacter species were the three leading Gram negative isolates.
Conclusion: In conclusion, this study showed a different microbiological profile which will help the physicians in selection of empirical therapy for CBP.
Keywords: Prostatitis, expressed prostatic secretion (EPS).

Introduction

Prostatitis is defined as an infection or inflammation of the prostate gland that presents as different categories with varying signs and symptoms. Pathologically, prostatitis is characterized by increased number of inflammatory cells within the prostate gland.[1] The National Institutes of Health (NIH) has classified prostatitis in 4 categaries[2]

1. Acute bacterial prostatitis
2. Chronic bacterial prostatitis
3. Chronic prostatitis and chronic pelvic pain syndrome (CPPS; further classified as inflammatory or non-inflammatory)
4. Asymptomatic inflammatory prostatitis

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Among the 4 syndromes, the most common is chronic prostatitis/chronic pelvic pain syndrome, accounting for 90 - 95% of prostatitis cases. Acute bacterial prostatitis and chronic bacterial prostatitis each make up another 25% of cases[1].

Patients with prostatitis present with vague symptoms and may include pain in the pelvic region, urethral symptoms, voiding dysfunction, sexual disorder, and possibly considerable psychosocial distress[3].

Clinical diagnosis of Prostatitis is mostly based on signs and symptoms. Laboratory diagnosis relay on microscopy culture of expressed prostatic secretion (EPS)[4].

Patients with CP/CPPS can present with wide variety of symptoms which may include dysuria, urinary frequency, urinary urgency, weak urinary stream and pain in the perineum.[5,6]

Diagnosis requires the patient to have had pelvic pain or urinary symptoms for more than three of the

previous 6 months with no evidence of ABP or urinary tract infection in that time.[7]
However, studies regarding bacterial prostatitis are limited in most developing countries including Pakistan. The aim of the present study is to determine microbiological profiles and resistance patterns of infecting organisms in prostatitis in a general hospital of Azad Jammu & Kashmir.

Objective

The objective of this study is to determine the bacterial agents and their antibiotic sensitivity pattern from EPS samples of patients presenting symptoms of chronic prostatitis.

Material and Methods

The study was carried out by collaboration of urology department and Microbiology departments, at Abbas Institute of Medical Sciences, Muzaffarabad over a period of 15 months from January 2015 to March 2016. Abbas Institute of Medical Sciences, Muzaffarabad, is a 400-bed referral hospital in northern region of Azad Jammu & Kashmir. Patients with sign and symptoms of chronic prostatitis (Lower Urinary Tract Symptoms, Chronic Pelvic pain and genital pain) were selected.

Procedure for taking sample

The patients were advised to empty the bladder before examination. At couch the patient adopted "supine position" with semi flexed and abducted legs. The digital examination of the rectum and prostate was executed with gloved & well lubricated index finger. The prostatic massage was performed by compressing the glandular substance firmly with the pad of finger from its lateral aspect to midline i.e., toward the urethra. When appeared at meatus, the Expressed Prostatic Secretion (EPS) were taken over sterile swab for the culture.

Specimens Processing

Specimens dealing: Specimens were inoculated onto 5% sheep blood agar, MacConkey agar and Chocolate agar. After inoculation the smear was made for gram staining. Blood agar and MacConkey plates were incubated aerobically at 37^{o}C for 18 to 24 hours. Chocolate agar plates were incubated at 37^{o}C in 5% CO_2 for 18 to 24 hours. Initially strains were identified based on the morphology on various media, gram staining, catalase test and oxidase tests. Isolates were further identified by biochemical tests using API-20E galleries (Bio Merieux, Marcyl, Etoile, France). Susceptibility testing was performed using the modified Kirby- Bauer disk diffusion method by using Muller Hinton Agar. The results were expressed as susceptible/resistant according to Clinical Laboratory Standards (CLSI) interpretive criteria[8].
The isolates found to be Methicillin Resistant (MRSA) based on disc sensitivity producing a zone of inhibition < 10 mm with 1ug oxacillin and <9mm with 5ug methicillin were regarded as Oxacillin/ Methicillin resistant Staphylococcus aureus (MRSA). The presence of Extended-spectrum beta-lactamase (ESBL) was detected by double disc synergy method. Quality control was performed by using reference strains of *Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922 and *Pseudomonas aeruginosa* ATCC 27853 to confirm consistency of materials, methods, and results.
WHONET Version 5.6 was used for compilation and calculation of data.

Results

During the period of study, a total of 298 samples of prostatic secretions from patients suspected with prostatitis were obtained and submitted for culture. The patients, who received systemic antibiotics in the previous week, were excluded from the study. Out of all other specimens, 177 (59.4%) samples yielded the significant bacterial growth. Out of all specimens, 108(36.2%) samples yielded no growth and 13 (4.36%) yielded normal meatal flora (*S. epidermidis*). The spectrum of organisms isolated is shown in Table 1. The frequencies of Gram-positive and Gram negative bacteria were 54.8%(n=97 and 45.2% (n=80), respectively. Methicillin sensitive *Staph. aureus* (MSSA) and Methicillin-resistant *Staph aureus* (MRSA) were the two leading Gram positive isolates while *E coli, Klebsiella and Acinetobacter species* were the three leading Gram negative isolates.

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Table-1: The frequency of bacteria isolated from prostatic secretions

Name of organism	Number
GRAM POSITIVE	
Staph. aureus	48(27.11)
Methicillin-resistant *Staph aureus* (MRSA)	36(20.33% among all isolates and 42.85 % among all Staph isolates)
Enterococcus species	*13* (7.34%)
GRAM NEGATIVE	
E.coli	*38* (21.46%)
Klebsiella species	11(6.21%)
Acinetobacter spp	*5* (2.82%)
Proteus	5 (2.82%)
Serratia species	4 (2.25%)
Pseudomonas aeuroginosa	4 (2.25%)
Stenotrophomonas maltophilia	2 (1.12%)
Enterobacter species	3 (1.69%)
Morganella morgani	3 (1.69%)
Other gram negative	5(2.82%)
TOTAL	**177**

Table 2 shows the Antibiotic resistance patterns of the most frequently isolated pathogens in prostatic secretions. 36(20.33% among all isolates and 42.85 % among all Staph isolates were found resistant to methicillin. Out of all MRSA isolates, non was found resistant to vancomycin and linezolid. However, methicillin resistant *Staph aureus* were showed no resistance to vancomycin and linezolid. For *Enterococcus spp*, there were no vancomycin resistant (VRE) isolate found. Extended spectrum beta-lactamase (ESBL) production was also tested in enterobacteriacae. For *E coli* and *Klebsiella* species, ESBL production was found 23.6% (9/38) and 27.27 %(3/11) respectively. Only 1 out of 5 (20%) *Acinetobacter* spp was found resistant to imipenem. All other enterobactericeae and *Pseudomonas aeuroginosa* were showed no resistance to imipenem

Table-2: Antibiotic resistance patterns of the most frequently isolated pathogens

Name of organism	Antibiotics	Resistance
Staph. aureus	Erythromycin	36 %
	Methicillin	20 %
	Ciprofloxacin	22%
	Gentamicin	32%
	Tetracycline	48%
	Clindamycin	18 %
	Vancomycin	0 %
	Linezolid	0 %
Escherichia coli	Ampicillin	94 %
	Amikacin	12 %
	Gentamicin	28%
	Cefuroxime	71 %
	Ceftriaxone	55 %
	Imipenem	0 %
	Ciprofloxacin	48 %
	Ceftazidine	42%
Klebsiella pneumoniae	Amoxicillin/clavulanic acid	87 %
	Amikacin	23 %
	Gentamicin	65%
	Cefuroxime	80 %
	Ceftriaxone	70 %
	Imipenem	0 %
	Ciprofloxacin	28 %
	Ceftazidine	71 %
Acinetobactert species	Ampicillin	100 %
	Amikacin	10 %
	Gentamicin	37%
	Cefuroxime	65%
	Ceftriaxone	52%
	Imipenem	9 %
	Ciprofloxacin	32 %
	Ceftazidine	42%
Pseudomonas aeuroginosa	Amikacin	19 %
	Gentamicin	41%
	Imipenem	18 %
	Ciprofloxacin	31 %
	Ceftazidine	28 %

Discussion

In Pakistan, data on nation-wide prostatitis pathogens has not been available to physicians. People with bacterial prostatitis appear to be at increased risk for persistent symptoms and recurrent episodes. For effective treatment the exact etiology of the disease matters. Because of diverse pathogens and pathogenesis[9], recurrence is more common so the treatment period should be longer than in other diseases.

The variability of pathogens causing prostatitis in patients reporting to our hospitals was also unknown. Henceforward, the results of this study provide significant base for further research. In this study, the EPS culture-positive rate is 59.4%(n=177). This Culture positive rate for EPS is higher than reported by Yong Sun Choi et al that is 41% for general hospital.

The variability of pathogens causing prostatitis in our hospitals also remains unknown. Hence, the results of

this study provide an important foundation for further research. In our study, the EPS culture-positive rate is 59.4 % (n=177). This Culture positive rate for EPS is higher than reported by Yong Sun Choi et al which is 41% for general hospital[10].

In our study, the frequencies of Gram-positive and Gram-negative bacteria in bacterial prostatitis were 54.8% (n=97) and 45.2% (n=80), respectively while Krieger et al and Brede et al reported 80% of the pathogens are Gram-negative organisms (e.g. *Escherichia coli, Enterobacter, Serratia, Pseudomonas,* and *Proteus* species) in bacterial prostatitis.[11,12]

The extraordinary finding in our study was the high rates of MRSA which is 20.33% among all isolates and 42.85 % among Staph isolates. Review of literature shows that no other study has shown such higher rates of MRSA in prostatitis. Case reports of MRSA from prostatitis have been reported by few researchers. Most of these patients gave the history of some recent gynecological procedures of their spouses. In our study, all MRSA isolates were found sensitive to vancomycin contrary to 15.5 % resistant reported by Hossam *et al*[13] and comparable to Nermin K Saeed *et al.*[14]*and Khan MA*[15]in various body specimens.

This organism rarely causes genitourinary infections. It is not clear that whether this organism is community-acquired methicillin-resistant S. aureus (MRSA) or hospital acquired MRSA. Another study is recommended for assessing the possible source of MRSA. The possibility of carriage from healthcare providers during specimen processing was ruled out by doing MRSA screening of all those involved.

We found ESBL production 27.27% and 23.6% in *Klebsiella* species and *E coli* respectively. The increasing extended-spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae and other enterobacteriaceae* have become a major concern. ESBL producing isolates should be reported as resistant to all penicillins, cephalosporins, and aztreonam.[16] Carbapenems are the treatment of choice for infections due to ESBL-producing organisms if it is sensitive. According to Korean Antimicrobial Resistance Monitoring System report, the incidence of ESBL-producing *Klebsiella pneumoniae* and *Escherichiacoli* in community-acquired prostatitis is 12.8% and 9.5% and the incidence in hospital-acquired infections is 78.6% and 25% respectively.[17]

We observed considerably high rates of MRSA as compared to other studies. In addition, we noted high rates ESLS producers. These findings emphasize the need to identify factors associated with antimicrobial resistance. Some risk factors for selected organism have been identified in previous studies and include advanced age, diabetes mellitus, urinary tract abnormalities, recurrent UTIs and urinary catheterization.[19,20]

This single center study data may not reflect microbiological profile and antibiotic susceptibility pattern from whole of the country. More studies are recommended on this topic to assess and develop a real picture.

The limitation of this study is the relatively small population sample. The enrollment of a greater number of patients is needed for a more reliable analysis. The second limitation is the non availability of PCR test for non cultivable organisms like *Chlamydia*, *Ureaplasma*, and that also contribute in the etiology of prostatitis.

In conclusion, this study showed microbiological aspects of CBP in a general public sector hospital. This may help in selection of appropriate empirical antibiotics. The results indicate that significant numbers of CBP are caused by Gram-positive organisms. Therefore, this etiology must be considered while prescribing the empirical therapy for bacterial prostatitis.

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