ejpmr, 2020,7(7), 107-112

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

BACTERIOLOGY PROFILE OF NON-CATETHERIZED PATIENTS WITH BLADDER OUTLET OBSTRUCTION

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Article Received on 28/04/2020 **Article Revised on 19/05/2020** **Article Accepted on 09/06/2020**

ABSTRACT

Background: Bladder outlet obstruction (BOO) is one of the commonest conditions seen by the Urologist. The prevalence is increasing, warranting effective management and prevention of complications. Objectives:

- To determine the bacterial organisms implicated in patients with bladder outlet obstruction.
- To determine the sensitivity pattern of empirical antibiotic used in this locality.

Materials and Method: A total of 102 patients were recruited for the study. The patient had urine microscopy, culture and sensitivity. Patients that were on antibiotics within the last 72 hours from time of sample collection and patients on catheter were excluded. Midstream urine samples were collected aseptically. Samples were processed within one hour after collection and cultured. Antibiotic susceptibility tests were carried out using modified Kirbby Bauer method.[1] **Results:** The predominant cause of the BOO was due to BPH (61.8%). A total of 22.5% of the patients had prior antibiotics more than three days before presentation to the hospital; 68.2% of the patients that used antibiotics used ciprofloxacin. The overall prevalence rate of bacterial organisms isolated in the urine of the subjects used for this study is 45.1%: Gram negative organisms were isolated in majority of the cases [78.2%]. The commonest organism cultured from the sample was *Klebsiella sp.* [43.5%]. The data was analyzed using SPSS version 22. **Conclusion:** The use of prophylactic antibiotics can be considered to be beneficial due to the increased susceptibility to urinary tract infection. Nitrofurantoin can be considered as an alternative to fluoroquninolones.

KEYWORDS: Bladder outlet obstruction, Prostate specific antigen, Microbiology.

INTRODUCTION

The study is a prospective descriptive study that was carried out in the Urology unit of the Surgery department, LAUTECH teaching hospital from June 2015 to February 2017. All non-catheterized male patients with bladder outlet obstruction within this period were included in the study. A total of 102 patients were recruited for the study. The patients had Prostate Specific Antigen (PSA), urine microscopy, culture and sensitivity. Patients that were on antibiotics within the last 72 hours from time of sample collection and patients on catheter were excluded.

BOO is one of the commonest conditions seen by the Urologist.[2,3,4,5] The prevalence is increasing, warranting effective management and prevention of complications like urinary tract infection.[6] Evaluation of such patients helps in clinical audit to revise archaic data and help to improve the management of patients.

BPH is one of the commonest causes of BOO.[7.8] The prevalence increases with age[7,9.10]; estimated to be about 50% in men over 40years and approaching 90% in men over 80years.[7] Other causes include cancer of prostate, urethral stricture, prostatitis and bladder neck stenosis.[2,7]

Complications associated with BOO include urinary tract infection, haematuria, nephrolithiasis, bladder calculi, obstructive uropathy and renal failure[2]. In the case of BPH, a fibroadenomatous hypertrophy of the prostate causes narrowing of the diameter of the prostatic urethra that can lead to reduced urine output and stasis.[3,9] This increases the risk of bacteria colonization that can lead to urinary tract infection.[1,9.11] Also, the increased pH of the

prostatic fluid and reduced zinc- associated antimicrobial factor with age may increase the risk of bacteria colonization that can lead to urinary tract infection.[9,12,13,14,15]

Adequate knowledge of the bacteria profile and sensitivity pattern in these patients is important for effective management to prevent complications like urinary tract infection and its sequelae.[16,17,18]

Most of the patients seen by the urologist have been evaluated by other doctors who may have commenced the patient on antibiotics before referring to the specialist. Prior antibiotic intake by the patient can affect the bacteriology profile of the patient.[18]

The organisms implicated are commonly Gram negative bacilli. *Escherichi* coli has been documented to be the commonest organism 31.8%[7] and 47.6% by Jude et al in Benin[3] and associated with multiple drug resistance.[7] Others include *Klebsiella sp.* 28.8%.[7]

Urinary tract infection (UTI) is one of the most common infection encountered by clinicians in developed and developing countries with an estimated annual global prevalence of two hundred and fifty million.[1,11]

Infection in the male population remains uncommon until after the fifth decade of life, when enlargement of the prostate begins to interfere with emptying of the bladder.[13,14]

UTIs occur when normal protective mechanisms fail.[15] These mechanisms include: dislodging of bacteria during urination, high urea concentration in the urine, antibacterial secretions from the prostate, high urine osmolality and white blood cells.[15]

Oni et al. in their study on patients with indwelling urinary catheter, in Ibadan, Nigeria, reported that the common agents of infection to be Klebsiella sp., E. coli, Proteus sp. and Staphylococcus aureus, in order of frequency.[23] Taiwo and Aderounmu reported that in Osogbo, Nigeria Klebsiella sp. were the commonest pathogen isolated with 46 (36.6%), followed by Pseudomonas sp. 34 (27.8%), E. coli 26 (20.6%), S. aureus 12 (9.5%), P. mirabilis 4 (3.2%), Candida albicans4 (3.2%) and coagulate negative staphylococcus 2 (1.6%).[24] Over 95% of the UTIs were caused by a single bacterium and 90% are E. coli.[13] Enterobacteriaceae (other than E. coli), Pseudomonas and Gram positive bacteria become increasingly frequent with complicated and hospitalized patients. Of the Gram positive bacteria enterococcus are the most important.[19]

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MATERIALS AND METHODS

The prospective descriptive study was carried out in the Urology unit of the Department of Surgery, from June 2015 to February 2017 at LAUTECH Teaching hospital Osogbo, Nigeria.

A total of 102 male patients were recruited for the study. The patients had Prostate Specific Antigen (PSA), urine microscopy, culture and sensitivity and ultrasound studies done.

Using standard sampling technique, mid-stream urine samples from non-catheterized patients were collected from a total of 102 patients into sterile universal containers. The samples for patients with complete bladder outlet obstruction were collected via catheterization under aseptic technique. The samples were processed immediately after collection. The deposit from the centrifuged urine specimen were examined under 10X and 40X of the microscope for the presence of pus cells, red blood cells, casts, crystals and bacterial cells and were recorded accordingly. The specimens were cultured, using a calibrated wire loop on Cysteine Lactose Electrolyte Deficient Agar and Blood agar for uropathogens. The seeded plates were incubated at 37°C for 24 hours.

Afterwards, the plates were examined for bacterial growth. Bacterial growths of $\geq 10^5$ CFU/ml were taken to be significant.[13] The isolates were identified by colony morphology, Gram staining, motility testing and standard biochemical tests. Antibiotic susceptibility tests were carried out using Kirby Bauer method as specified by CLSI guidelines.[1]

RESULTS

A total of 102 male patients were studied. Tables and graphs were used in illustrating the data. The mean age was 56±2.5. The percentage of patients that were elderly was 52.0%, 44.1% were middle aged and 3.9% were young adults as illustrated in Table 1.

The patients had different levels of education. The histogram showed that 30.4% of the patients had no formal education: 22.5%, 26.5% and 20.6% had primary, secondary and tertiary level of education respectively.

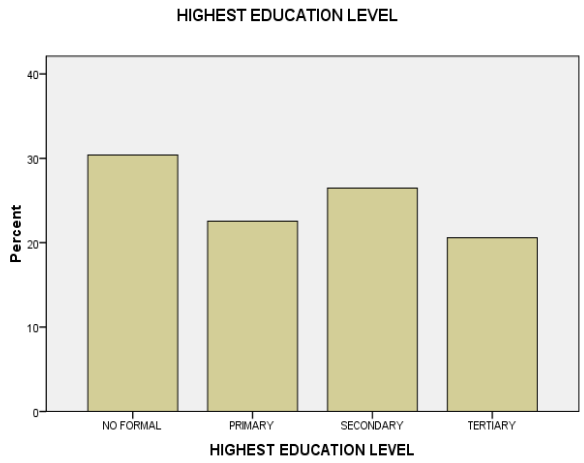
A significant percentage of the patients (41%) presented within 6 months of the onset of symptoms as depicted in Table 2. The predominant etiology of bladder outlet obstruction was BPH (61.8%). Other causes were due to cancer of the prostate [24.5%], urethral stricture [12.7%] post- prostatectomy bladder neck stenosis [1.0%]. The most common symptoms were obstructive symptoms in 76.5% followed by irritative symptoms in 18.6% of cases as shown in Table 4.

About one-fifth (22.5%) had prior antibiotics before presentation (Tables 5 and 6)
In Table 7 bacteria were isolated from the urine samples of 46 patients (45.1%). Gram negative organisms were isolated in majority of cases and *Klebsiella sp.* was the most predominant (43.5%). Other organisms isolated include: *Escherichi coli* 13.0%, *Proteus mirabilis* 6.5% and *Pseudomonas sp.* 15.2%. The only Gram positive organism that was cultured from the sample was *Staphylococcus aureus* [19.6%].

The sensitivity pattern of *Klebsiella spp* was more with nitrofurantoin [27.3%], Imipenem [20.5%] and repamin [9.1%] as illustrated in Table 8. There was sensitivity to fluoroquinolones in 4.5% of the cases.

Table 1: Age Distribution.

Age group	Frequency	Percentage (%)
Elderly	53	52.0
Middle age	45	44.1
Young adult	4	3.9
Total	102	100



Graph 1.

Table 2: Duration of Symptoms.

Duration (months)	Frequency	Percentage (%)
<6MONTHS	50	49.0
6 – 12	22	21.6
12-24	18	17.6
> 24MONTHS	12	11.8
TOTAL	**102**	**100.0**

Table 3: Causes of Bladder Outlet Obstruction.

Cause	Frequency	Percentage (%)
BPH	63	61.8
Prostatic cancer	25	24.5
Urethral stricture	13	12.7
PPBNS	1	1.0
TOTAL	**102**	**100.0**

Table 4: Presenting Symptoms.

Predominant Luts	Frequency	Percentage (%)
Obstructive	78	76.5
Irritative	19	18.6
Both	5	4.9
Total	102	100.0

Table 5: Recent Antibiotic Use For Symptoms.

Antibiotic use	Frequency	Percentage (%)
No	79	77.5
Yes	23	22.5
Total	**102**	**100.0**

Table 6: Antibiotics Used Prior To Presentation.

Antibiotic	Frequency	Percentage (%)
Augmentin	1	4.55
Cefuroxime	1	4.55
Ciprofloxacin	15	68.20
Levofloxacin	3	13.60
Nitrofurantoin	2	9.10
Total	22	100.00

Table 7: Prevalence of Organisms Isolated.

Organism	Frequency	Precentage (%)
Klebsiela sp.	20	43.5
Escherichi Coli	6	13.0
Proteus Mirabilis	3	6.5
Pseudomonas sp.	7	15.2
Staphlococcus aureus	9	19.6
Candida albican	1	2.2
TOTAL	**46**	**100.0**

Table 8: Pattern of Antibiotic Sensitivity.

Antibiotic	Frequency	Percentage (%)
Nitrofurantoin	12	27.3
Imipenem	9	20.5
Repamin	4	9.1
Gentamycin	4	9.1
Maxpan	3	6.8
Ceftazidine	3	6.8
Ceftriaxone	2	4.5
Cefuroxime	1	2.3
Azithromycin	2	4.5
Levofloxacin	2	4.5
Augmentin	1	2.3
Streptomycin	1	2.3
Total	**44**	**100.0**

Table 9: Pattern of Antibiotic Resistance.

Antibiotic	Frequency	Percentage (%)
Amoxicillin	4	9.1
Ampicillin	1	2.3
Augmentin	2	4.5
Azithromycin	1	2.3
Cefotaxime	1	2.3
Ceftazidine	1	2.3
Ceftriaxone	3	6.8
Cefuroxime	4	9.1
Ciprofloxacin	2	4.5
Cloxacillin	1	2.3
Erythromycin	2	4.5
Gentamycin	2	4.5
Maxpan	2	4.5
Nitrofurantoin	3	6.8
Ofloxacin	1	2.3
Oxacillin	9	20.5
Penicillin	1	2.3
Tetracyclin	2	4.5
Vancomycin	2	4.5
Total	**44**	**100.0**

DISCUSSION

All subjects used for the study were male and the major cause of BOO was BPH (61.8%). Cancer of the prostate caused 24.5% and urethral stricture 12.7%. Prostate conditions are unique to males and only one case of BOO was identified in a female within the period of study which was excluded in the studied sample.

There is steady increase in the prevalence of urinary tract infection with age among the patients**,** 3.9% were young adults, 44.1% were middle aged and 52.0% elderly.

(Table 1) agrees with the submission of Oshodi et al.[19] that the prevalence of UTI promoted by stasis secondary to BOO should increase with age.

Most of the patients presented less than 6months of onset of symptoms (49%). 30.4% of the candidates had no formal education which could attribute to poor habit of seeking medical attention.[20]

The usual pattern of presentation were obstructive symptoms (76.5%); 4.9% presented with both obstructive and irritative symptoms. In this study, 45.1%[46] had bacteriuria; this could be attributed to 22.5% of the candidates that had used antibiotics prior to presentation.[21,22] The use of prophylactic antibiotics can be considered to be vital in this group of patients.[5,9] Among those that had used antibiotic, ciprofloxacin accounted for 63%, levofloxacin 13%. This could have affected the bacteriology profile as *Escherichi coli* [13.0%] was not the predominant bacteria cultured unlike the study in Benin 47.6%[9] and 31.8%.[11]

The predominant organisms Isolated were gram negative bacteria (78.2%). *Klebsiella* spp was the most common (43.5%) followed by *Pseudomonas* sp. (15.2%), *Escherichi coli* (13.0%) and *Proteus mirabilis* (6.5%). This could be attributed to enteric flora accessing the genitourinary tract due to its proximity of the urethra to the anus and subsequent ascending infection into the bladder.[9] *Escherichi coli* has been documented as the commonest organism isolated.[7,9] contrary to this study which may be due to prior use of antibiotics by some of these patients. Oni et al. in their study on patients with indwelling urinary catheter, in Ibadan, Nigeria, reported that the common agents of infection to be Klebsiella sp., E. coli, Proteus sp. and Staphylococcus aureus, in order of frequency.[23] Taiwo and Aderounmu reported that in Osogbo, Nigeria Klebsiella sp. were the commonest pathogen isolated with 46 (36.6%), followed by Pseudomonas sp. 34 (27.8%), E. coli 26 (20.6%), S. aureus 12 (9.5%), P. mirabilis 4 (3.2%), Candida albicans4 (3.2%) and coagulate negative staphylococcus 2 (1.6%).[24]

Gram positive bacterial infection accounted for 19.6% and the only gram positive bacteria was *Staphylococcus aureus.*

The bacterial organisms were more sensitive to nitrofurantoin (27.3%) than the fluoroquinolones(4.5%). This was contrary to the previous belief of the locality that the organisms were more sensitive to fluoroquinolones: warranting a periodic review of empirical treatment in this environment. It should also be taken into consideration that 22.5% of the patients had used ciprofloxacin a flouroquinolone, prior to presentation and this can affect the sensitivity pattern.

Furthermore, the study in Benin also showed greater sensitivity to imipenem [90.5%], meropenem [88.9%] and nitrofurantoin [85.7%].[9]

The findings in this study showed that nitrofurantoin may be beneficial in the treatment of these patients in this locality; further conclusive studies can be carried out by designing and conducting a prospective- analytical study between fluoroquinolones and nitrofurantoin. Nitrofurantoin can be considered because it is cheap, readily available and has a convenient route of administration (oral) than imipenem which also showed a good sensitivity profile of 26.5% in this study: the only available preparations are intravenous in this locality.

The uncommon use of Vancomycin in this locality could be associated with the lower resistance obtained here [4.5%] compared to that by Parameswarappa et al[25], Kamga et al. [32%]. Also it is in contrast to the studies of Mittal S et al[26]., China and Gupt, Garg et al. who reported high resistance to vancomycin.

CONCLUSION

A fore knowledge of the bacteriology profile of patients with bladder outlet obstruction is beneficial for effective

management. The possibility of geographical variation of antibiotic sensitivity is to be taken into consideration.

Klebsiella sp. was the predominant organism isolated organism in this study.

Nitrofurantoin may be considered as a choice for treatment and periodic re-evaluation of the sensitivity pattern should be considered.

ACKNOWLEDGEMENT

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