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Microorganisms Associated with Prostatitis Using Indwelling Urinary Catheters in Okigwe, Imo State, Nigeria

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Abstract: Indwelling urinary catheters are standard medical devices utilized in both hospital and nursing home settings to relieve urinary retention and urinary incontinence in a prostatitis patient. The microorganisms associated with prostatitis using urinary catheters was carried out in Okigwe, Imo State using culture technique. 200 patients were examined for prostate specific antigens (PSA) using quantitative and qualitative tests and antibiotic susceptibility tests were also done. Out of 200 patients tested for PSA, 119 (59.5%) and 129 (64.5%) were positive for quantitative and qualitative respectively. 85 patients were catheterized with 80 (94.15%) having bacterial isolates while 75 (65.5%) of the 115 uncatheterized patients having bacterial growth. The organisms isolated from catheterized and uncatheterized patients were *Escherichia* coli 55 (3.5*%), Klebsiella* spp 12 (7.8%), *Staphylococcus aureus* 42 (27.0%), *Streptococcus* 20 (12.9%), *Protus* spp 13 (8.4%) and *Pseudomanas* 13 (8.4%). Higher bacterial loads were observed in the catheterized patients urine than in the uncatheterized. Streptomycin, Ceftriaxone and Augumentine were the drugs of choice in the sensitivity tests while high antimicrobial resistant rates were observed with Ampiclox, Septrin and Chlorophenicol. Generally, high prevalence rate of PSA and bacterial pathogens were reported in patients of high age (50 and above years). This calls for proper medical checks for men of 50 years and above. This check will prevent the development of prostatitis which could lead to fertility problems because of difficulty in ejaculation in prostatitis patients.

Keywords: Prostatitis, Urine, Catheter, Bacteria, Antibiotic Sensitivity

1. Introduction

Prostatitis is an infection or inflammation of the prostate gland that presents as several syndromes with varying clinical features. The term prostatitis is defined as microscopic inflammation of the tissue of prostate gland and is a diagnoses that spans a broad range of clinical conditions. Inflammation is an accompaniment to an infection, but not all inflammatory reactions can be explained by an infection. This condition has caused great confusion over the treatment of prostatitis, a situation that continues to apply today. Pain or discomfort is the most severe and frequent symptom and not forgetting the importance and role of sexual dysfunction in these patients (Paul, 2017). Urinary tract infections in men are often the result of an obstruction, for example, a urinary stone or enlarge prostrate or are from a catheter, used during a medical procedure. Prostate patients that are using indwelling catheters are predisposed in infection due to the presence of an indwelling catheters device (Jascobs *et al*; 2008).

In the normal urinary tract, the flushing of the urethra as the bladder empties helps to impede the ascending

infection of the tract by the bacteria that normally colonized the periurethral skin. The bladder is lined by urthelial cells coated with a glycosaminogly can mucin which provides a surface resistant to the adherence occur, it initiates invasion of the urothelium. This activities microbial-sensing proteins is the superficial umbrella cells, triggering the most defences with a cascade of cellular and molecular effectors t eliminate the bacteria. (Roger *et al*; 2015).

Causative agent of urinary tract infection Causative agent

Urine is generally considered to be sterile and is believed to be germ free. Any source of possible infection occurs through urethra which initiates the incidence of the infection. The predominant pathogen responsible for UTI is *E. coli* which constitutes up to 80-85% and is followed by *Staphylococcus saprophyticus* which accounts to 5-10%. The occurrence of the infection due to viral or fungal agents is a rare phenomenon. In addition to the above mentioned bacterial species, *Klebsiella*, *Proteus*, *Pseudomonas* and *Enterobacter* are associated with UTI. The bacteria enter the bladder through urethra and the infection can also occur through blood and lymph. The microbial etiology of UTIs is deemed to be well established and frequent. Pathogens like *E. coli* and *S. saprophyticus* are associated with population acquired acute uncomplicated infection where as *Klebsiella*, *Enterococcus*, *Proteus Species*, *Enterobacter* are known to confer uncomplicated cystitis and phylonephritis (Demilie *et al*; 2012).

Prostrate infections-chronic bacterial prostatitis are harder to cure because antibiotics may be unable to penetrate infected prostrate tissue effectively. For this reason, man with bacterial prostatitis often used long-term treatment with a careful selected antibiotic. Urinary tract infections in men are frequently associated with acute bacterial prostatitis, which can be life threatening if not treated urgently. It is considered among the most poorly understood medical problems. Prostatitis has been linked with male infertility and treatment of prostatitis may restore male reproductive function.

Indwelling urinary catheters are standard medical devices utilized in both hospital and nursing home settings to relieve urinary retention and urinary incontinence. Of the almost, 100 million catheters that are sold annually worldwide (Bower *et al;* 2005). Urethral catheterization is safer than suprapubic catheterization due to its ascending method of emptying the bladder. In suprapubic catheterization, if proper guideline of inserting the catheter is followed there may be little or no risk of serious complication (Harrison *et al*; 2011). Patient with suprapubic catheterization usually develop other complication few weeks after inserting the catheter. This complication occurred despite cystoscopy control and adequate bladder Catheter-associated with urinary tract infections are the most common type of nosocomial infection, account for over 1 million cases annually or over 40% of all and nosocomial infections in hospitals and nursing homes (Stam, 2005).

2. Materials and Methods

SPECIMEN COLLECTION FOR PROSTATE SPECIFIC ANTIGEN (PSA) TEST

3ml of Venous Blood of the suspect was withdrawn and put into in a clean serum gel test tube and allowed to stand for 10-15mins. The blood samples were centrifuged for 5 minutes leaving the serum on top. This serum was collected with pipette and stored at 20°C until required for use. (Cheng-Ching *et al*; 2015)

2.1. Examination of Blood for Psa Using Acon Cassette

About 1ml of serum was poured into a dried test tube. Two drops was transferred to the sample well on the PSA cassette to allowed the blood to migrate. The test was interpreted within 5-10 minutes (A single line on the Acon cassette shows negative while double lines shows positive) (Cheng-Ching *et al*; 2015)

2.2. Examination of Psa Using Microtiter Plate Reader

The desired number of coated wells for the test was secured. 50ul of standards, specimen and control was dispensed into the appropriate wells. 50ul of Zero Buffer was dispensed into each well. They were thoroughly mixed for 30 seconds. It was very important to have a complete mixing in the process. The mixed samples were incubated at room (18-25°C) for 60 minutes. The incubated mixture was removed by emptying the plate contents into a suitable waste container. The emptied microtiter wells was rinsed 5 times with distilled water. The wells was strike sharply onto absorbent paper to removed all the residual water droplets used. 100ul of Enzyme Conjugate Reagent was dispensed into each well and gently mixed for 10 seconds. The wells was incubated at room temperature (18-25°C) (Cheng-Ching *et al*; 2015) for 60 minutes. The incubated mixture was emptied into a suitable waste container, it was rinsed and emptied the microtiter wells 5 times with distilled water. The wells was striked sharply onto absorbent paper to removed residual water droplets used. 100ul of TMB Reagent was dispensed into the wells and gently mixed for 10 seconds. It was incubated at room temperature for 20 minutes. The reaction of the mixture was stopped by adding 100ul of Stop Solution in each well and gently mixed for 30 seconds to make sure that the blue color changes to yellow color completely. It was read using microtiter plate reader at 450 density within 15 minutes (Cheng-Ching *et al*; 2015).

2.3. Specimen Collection for Urnie Analysis and Urine Culture

Patients hand were washed before they were given a sterile, dried, wide-necked leak-proof container to collect a 10-20mls of midstream urine (MSU) specimen for uncatheterized patients. For the catheterized patients, the urine specimen were collected from the catheter device

before connecting the urine bag. The specimens were labelled appropriately (Cheesbrough, 2006).

2.4. Examination of Urine Wet Preparation

Aseptically, 10mls of well mixed urine was transferred into a labeled conical tube. Was centrifuged at 500-1000g for 5 minutes, the supernatant fluid was poured out by completely inverted the tube into the second container. The sediment was mixed by tapping the bottom of the tube, one drop of the well-mixed sediment was transferred on a slide and cover with cover glass and examined microscopically using the 10x and 40x objective lens with the condenser iris closed (Cheesbrough, 2006).

2.5. Urine Culture

The urine specimen was inoculated on cystine lactose electrolyte-deficient (CLED) agar using the streaking technique of Cheesbrough (2006), the inoculated plates was incubated at 37°C for 24-48hrs and observed for bacterial growth (Cheesbrough 2006).

2.6. Antibiotic Susceptibility Testing

The kirby-Bauer disk diffusion method was performed using Mueller Hinton agar. It was prepared and sterilized in accordance with manufacturer instruction (Chessbrough, 2006).

3. Results

Table 1 In Okigwe, out of 200 patients tested for PSA using qualitative method 119 (59.5) patients were positive with PSA level of 4.0ng and above and 81 (40.5) patients were negative with PSA level below 4.0ng. 71-80 years of age had the highest number of positive PSA of 45 (21.0) while 21-30 years of age were all negative to PSA.

Figure 1 Shows the social economic status related to PSA using qualitative method of PSA testing from the studied patients in Okigwe. out of 200 patients tested, applicant and unemployed had the highest PSA positive patients result with 46 (76.65) while civil and public servant had the lowest result with 8 (26.6%). Figure 2 Shows the quantitative method of PSH using kit (acon strip). Out of 200 patient tested in GHH, 129 (64.5%) wee positive with 80 years and having the highest positive result 18 (90.0%) while 21-30 years had the lowest with 1 (20.0%). Figure 3 Shows the percentage of the social economic status related to PSA, Okigwe using qualitative method. In Okigwe, 200 patients were tested using kit (Acon) the farmers had the highest value of 35 (81.5%) while student had the lowest value of 3 (30.0%). Figure 4-5 Shows the bacterial isolated from the catheterized and uncatheterized urine patient from Okigwe. In Okigwe total of 115 patients were uncatheterized, 75 uncatheterized urine sample yielded growth while 40 urine sample had no significant growth after 48 hours, incubated *Escherichia Coli* (*E.coli*) had the highest bacterial frequency of 27 (36.0%) while *Klebsiella spp* had the lowest of 5 (6.6%). catheterized patient in Okigwe were 85, out of 85 catheterized patient 80 patient urine sample yielded growth while 5 patient urine sample did isolate any growth *Escherichia coli* had the highest growth of 28 (35.0%) while *Protus spp* had the lowest bacterial isolate of 5 (6.2%). Figure 6 Shows the effects of PSA results on hemoglobin estimation. Its shows the higher the PSA levels the lower the hemoglobin level. 71-80 years of age had the highest PSA level of 158.0ng with the lowest Hb level of 8.0g/l.

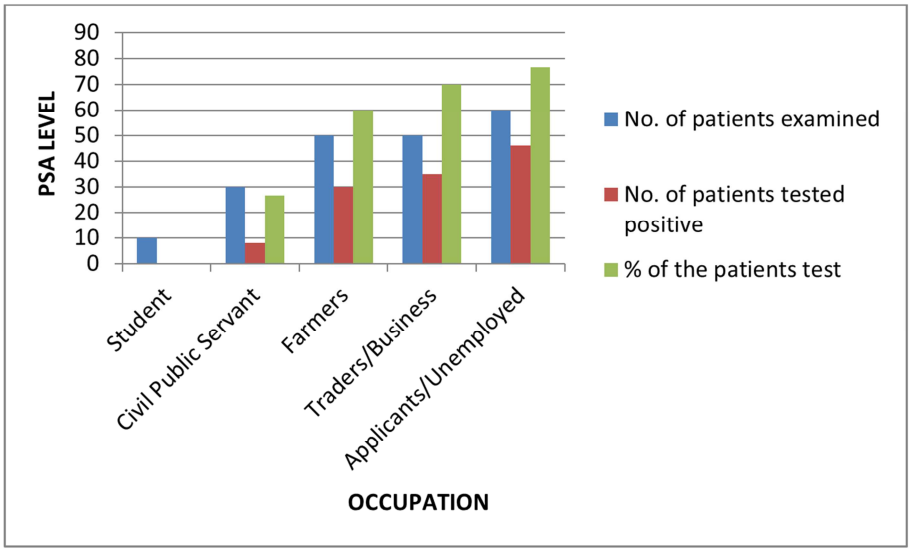

Figure 1. *Percentage of the socio- economic status related to PSA patients tested in Okigwe.*

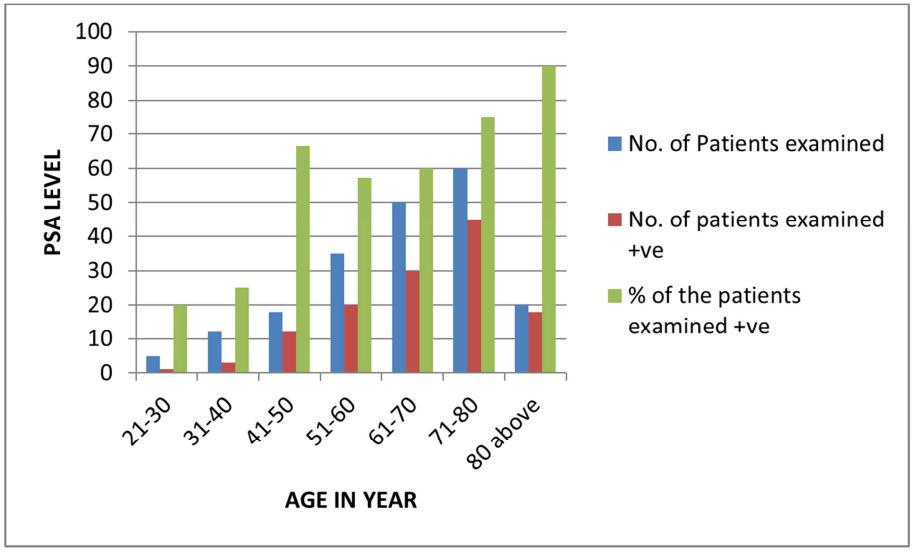

Figure 2. *Percentage of the PSA patients tested +ve in Okigwe using qualitative methods.*

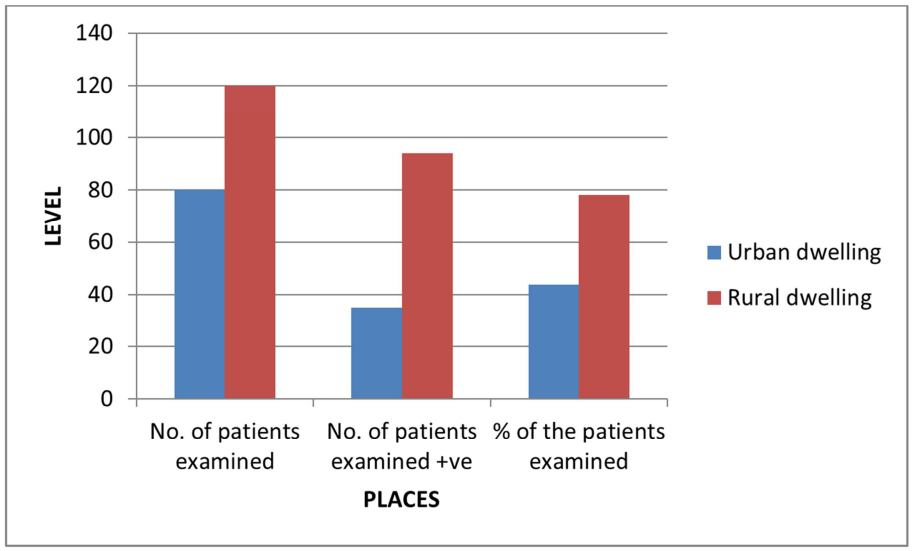

Figure 3. *The dwelling place related distribution of PSA among the target population in Okigwe.*

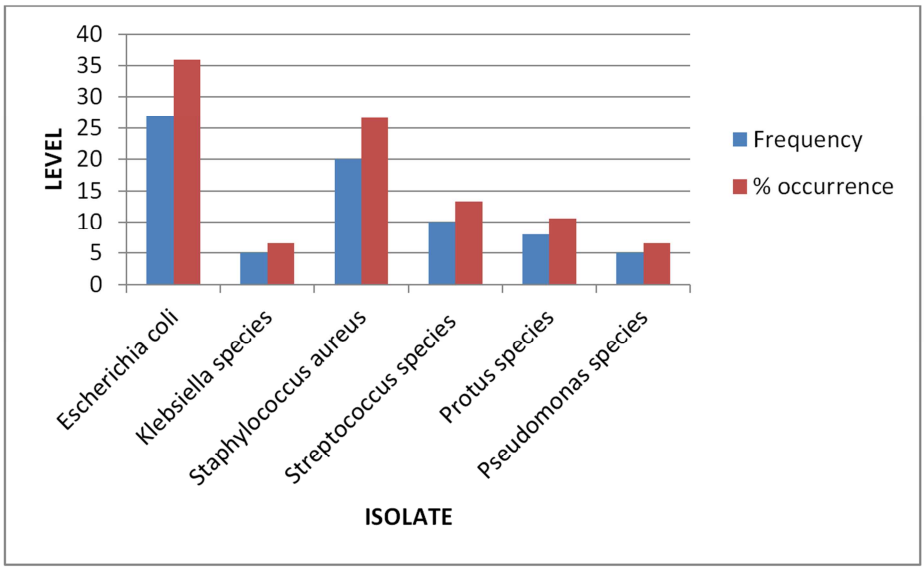

Figure 4. *Bacterial isolates from uncatheterized patients from Okigwe.*

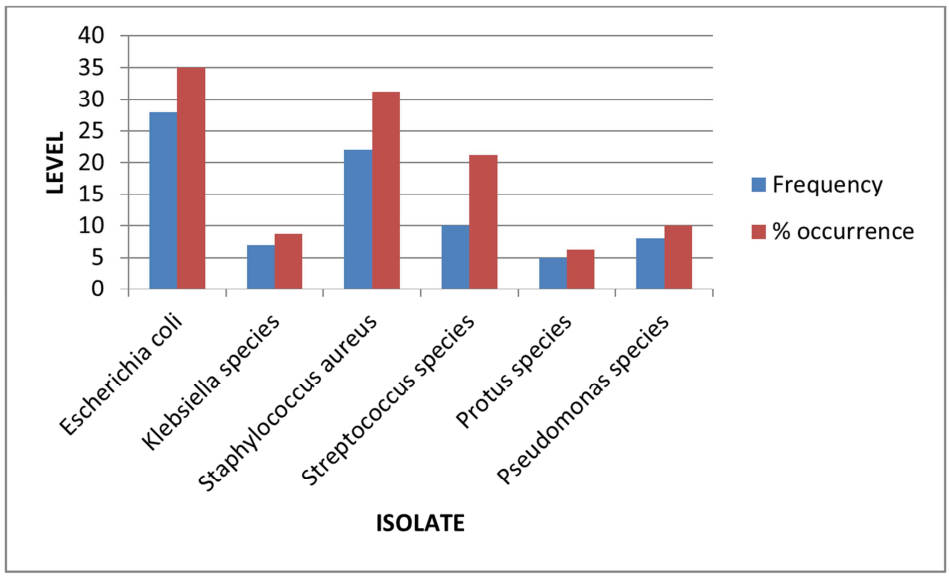

Figure 5. *Bacterial isolates from urine catheterized patient from Okigwe urine.*

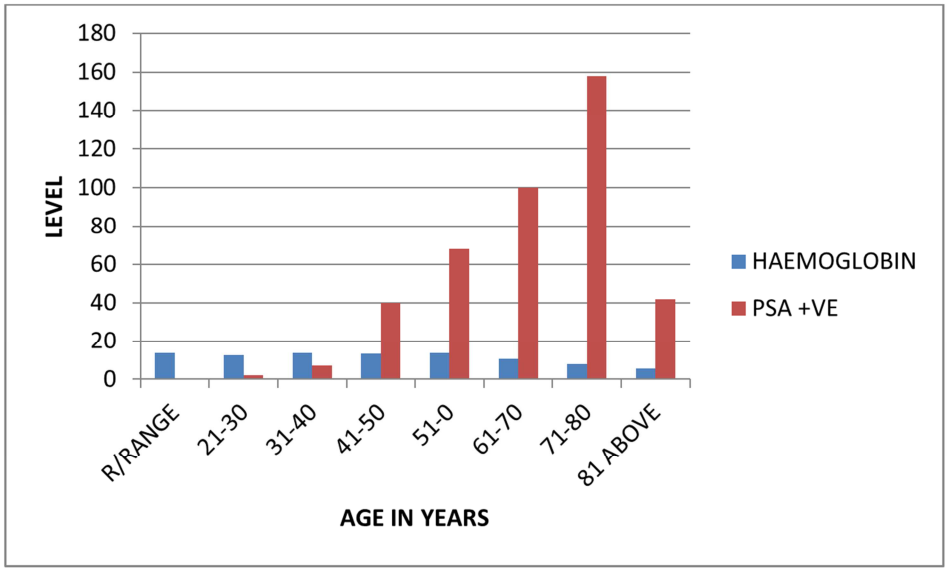

Figure 6. *The impact of PSA on Haemoglobin level.*

Table 1. *Age distribution of PSA levels in Okigwe, Imo State.*

Age	No. Patient Examined	Normal 0-4ng/dl	4.1-10	10.1-20	20.1-30	30.1-40	40.1-50	50.1-60	70.1-100	Above 100ng/dl	PSA Positive patient
21-30	5 (2.5)	5 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
31-40	12 (6.0)	11 (13.6)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.8)
41-50	18 (9.0)	10 (12.3)	1 (5.9)	1 (6.2)	2 (16.7)	1 (5.3)	1 (5.0)	2 (12.5)	0 (0.0)	0 (0.0)	8 (6.7)
51-60	35 (17.5)	15 (18.5)	4 (23.5)	5 (31.2)	2 (16.7)	2 (10.5)	4 (20.0)	3 (18.7)	0 (0.0)	0 (0.0)	20 (16.8)
61-70	50 (25.0)	22 (27.1)	8 (47.0)	5 (31.2)	2 (16.7)	7 (36.8)	3 (15.0)	2 (12.50)	1 (11.1)	0 (0.0)	28 (32.5)
71-80	60 (30.0)	15 (18.5)	3 (17.6)	5 (31.2)	5 (41.7)	7 (36.8)	10 (50.0)	5 (31.20)	5 (55.5)	5 (50.0)	45 (21.0)
Above 80	20 (10.0)	3 (3.7)	0 (0.0)	0 (0.0)	1 (8.3)	2 (10.5)	2 (10.0)	4 (23.50)	3 (33.3)	5 (50.0)	17 (14.3)
Total	200 (100)	81 (40.5)	17 (8.5)	16 (8.0)	12 (6.0)	19 (9.5)	20 (10.0)	16 (8.0)	9 (4.5)	10 (5.0)	119 (59.5)

1. Positive PSA level refers to those with PSA value of 4ng/l and above
2. Those in brackets are the percentage values.

4. Conclusion

Indwelling urinary catheters are standard medical devices utilized in both hospital and Nursing home settings to relieve urinary retention and urinary incontinence. Catheter induced urinary tract infection is the most common health care associated infections, with the vast majority of the infections

occurring after placement of the convenience, uncomfortable, often unnecessary and easily forgotten urinary catheters. In an inflamed prostate patients that the urethra can not emptied urine, catheter is advised to be used. Since Indwelling urinary catheterization is safer than supra public due to it's ascending method of emptying the bladder.

Reduction of the duration of catheterization of the prostate patients has a positive impact on reduction of urinary tract infection. Catheter should be removed once it's no longer needed to reduce the rate of biofim growth on the catheters..

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