

An Assessment of Asymptomatic Bacteriuria among Women with Vesico-Vaginal Fistula in South-Eastern Nigeria

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Original Article

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Abstract

Objective

Vesico-vaginal fistula (VVF) involves the pathological communication between the urinary bladder and vagina, possible complications arising from urinary tract infection merits consideration. This study seeks to evaluate significant bacteriuria among VVF clients.

Setting

The setting was the South east Fistula Centre, Abakaliki, Ebonyi State, Nigeria.

Population

This was a total population study of all consenting HIV negative VVF clients.

Method

This cross-sectional study assessing asymptomatic bacteriuria was conducted among 109 HIV negative VVF clients using standard microbiological technique. Haematological and anthropometric parameters were also assessed.

Results

The prevalence of asymptomatic bacteriuria was 76.1% and the highest prevalence was among clients aged 21-30years (90.3%), those who have had more than seven deliveries (85.0%) and those whose labour duration lasted above 48hours (76.7%). The prevalence of bacteriuria was least among women with VVF for less than a year. The prevalence was highest among patients with intra cervical fistula (83.3%). Bacteriuria prevalence was highest among women of blood group AB (100%). The rate was higher among women whose heights were > 1.53metres and whose weights were < 51kilogram. Six different bacterial species isolated include *E. coli* (41.0%), *Proteus* species (21.7%), and *Klebsiella* species (18.1%). Though the bacterial isolates were resistance to many of the antibiotics assessed, the highest level of resistance was observed with perfloracin, cotrimoxazole, while the highest level of susceptibility was with Ciprofloxacin.

Conclusion

The prevalence of bacteriuria in this study is rather high and should not be neglected in the management of VVF clients.

Key Words

Assessment, Asymptomatic Bacteriuria, VVF, Southeast Nigeria

Background

Vesicovaginal fistula (VVF) is a major gynaecological problem worldwide. In the developing countries VVF is considered as a significant public health challenge to safer motherhood because the magnitude of the problem to maternal health is immense¹. VVF has been described as an abnormal fistulous tract extending between the bladder and the vagina that allows the continuous involuntary discharge

of urine into the vaginal^{2,3}. The basic aetiological and underlying factors responsible for obstetric fistula include obstructed labor, accidental injury at the time of cesarean section, forceps delivery, craniotomy, symphysiotomy, traditional surgical practices including circumcision and gishiri and complications of criminal abortion^{2,4}. However in developing countries 85-97% of Fistula relate to prolonged obstructed labor,^{2,3,5,6}. The overwhelming proportions of these cases are associated with complications of neglected obstructed labor^{1,2}. Numerous reports have indicated that Nigeria is one of the countries in Africa with a very high rate of VVF^{7,8,9,10,11}. A recent report¹² from one of the Teaching Hospitals in Nigeria showed that one in every 122 parturients during the period under review had fistula. The problem of VVF in Nigeria is attributed partly to lack of skilled maternity care to increasing cases of underage pregnancies⁹. Other underlying factors playing major contributory roles include illiteracy, poverty, ignorance, home delivery, non-utilisation of antenatal and intrapartum medical facilities and the habit of performing traditional episiotomy - "Gishiri cut" by untrained traditional birth attendants, husband dominance and severe deprivation and neglect^{2,7,13,14}. VVF is thus considered as one of the greatest misfortune that can happen to a woman and complications can arise from a number of factors including underlying urogenital infectious diseases and ammonia dermatitis^{15,16}. Because VVF is a direct pathological communication between the urinary bladder and the vagina resulting in the uncontrolled leakage of urine into the vagina from the bladder, complication arising from bacterial urinary tract infection (UTI) is a possibility. Findings from some previous reports have suggested that significant bacteriuria can lead to UTI which can cause some complications in VVF condition either before or after repairs^{17,18,19}. Although presence of bacteria in the urine of an individual without obvious signs or symptoms of a urinary tract infection has been described as asymptomatic bacteriuria²⁰, this condition has been associated with an increased incidence of pyelonephritis especially among pregnant women²¹. In addition several workers^{13,22,23} have noted that recurrent UTI due to bacteriuria are among the medical problems usually encountered by patients with VVF. In several fistula centres in Nigeria, the place of prophylactic antibiotics in the management of fistula clients has remained a controversial issue though hard data either supporting or refuting its place is lacking in the literature². Empirically many fistula surgeons recommend the intake of large volumes of water for fistula clients awaiting surgery as a means of reducing the microbial load in the bladder of these clients prior to surgery². However the effectiveness of this preoperative therapy has not been subjected to scientific evaluation. In Nigeria as in many other developing countries with high rates of VVF cases, there is scarcity of comprehensive data on bacteriuria or urinary tract infection among women with VVF. Therefore the overriding objectives of this study were two folds. First was to conduct a comprehensive assessment of asymptomatic bacteriuria among women diagnosed with VVF awaiting surgery who had a minimum fluid intake of about 6litres for a minimum of 48hours before surgery, with

a view to providing baseline data. The Second objective was to provide information on asymptomatic bacteriuria which would inform adequate management of UTI among the increasing cases of VVF in low resource settings where routine microbiological examination of the urine in these women suspected to have UTI may not be readily available.

Materials and Methods

Study Population

This study was a hospital-based cross sectional study which was conducted at the South East VVF Centre Abakaliki South-eastern Nigeria from September to October 2010. The Centre is located in the premises of Ebonyi State University Teaching Hospital (EBSUTH) Abakaliki and is a major health facility for the treatment and management of VVF cases in Southern Nigeria. The Centre has a 90 bed capacity and has conducted surgical repairs of 625 VVF cases since its inception in December 2008. Women who visited the VVF Centre for medical attention during the study period who fulfilled the following study inclusion criteria were enrolled into the study: (i). diagnosed with VVF, (ii). scheduled for surgical management/repair, (iii). HIV negative, (iv). had not being on any antibiotic medication at least three months before enrolment into the study, (v.) had daily fluid intake of a minimum of six litres for a least 48hours before surgery.

Ethical Considerations

Ethical and study protocol approval was granted by the ethics committee of the Southeast Fistula Centre Abakaliki Nigeria. The approval was on the agreement that patient anonymity must be maintained, good laboratory practice/quality control ensured, and that every finding would be treated with utmost confidentiality and for the purpose of this research only. All work was performed according to the international guidelines for human experimentation in clinical research²⁴.

Sampling Technique

Women who fulfilled the study inclusion criteria within the study period were enrolled into the study. All the enrolled subjects were certified HIV negative following antiretroviral screening at the diagnostic laboratory of the South East Fistula Centre Abakaliki. After obtaining informed consent, a questionnaire was used to obtain relevant socio-demographic and gynaecological parameters from each participant. Parameters included age, educational status, number of previous deliveries, labour duration, mode of delivery, duration of Fistula, number of miscarriages, antibiotic use etc. Thereafter, venous blood sample was collected from each subject by venepuncture technique for the determination of ABO blood group. The weight and height of the clients was determined. Prior to the surgical management, urine sample was collected from each subject in the lithotomy position using the catheterization technique described by Yates²⁵ into sterile universal specimen containers.

Laboratory Analysis

The hemoglobin genotype was determined by the haemoglobin electrophoresis technique at alkaline pH using cellulose acetate membrane (CAM)²⁶. The ABO blood grouping test was performed using the slide method² with commercially available reagents (Murex Diagnostics, Inc. Dartford, UK). The urine samples were aseptically cultured on blood agar (BA) medium and cystine lactose electrolyte deficiency (CLED) medium according to standard protocol as described previously^{27,28}. The culture plates were incubated aerobically at 37°C for 24 hours. Colonial characteristics, gram reaction, catalase and coagulase tests, haemolysis on BA medium, lactose fermentation on CLED medium and other biochemical tests such as indole production, citrate utilization, urase activity, triple sugar iron (TSI) agar test (for glucose, sucrose, and lactose fermentation), gas and hydrogen sulphide production and oxidase test were conducted as described previously^{27,28}, for bacterial isolation and identification. The presence of bacteriuria was described as bacteria count of equal or greater than 10⁵ colony forming units per ml of urine (cfu/ml)²⁸. Bacteria isolates made were subjected to antibiotic sensitivity analysis using the disc diffusion methods^{27,29}. The antibiotics tested were gentamicin, ciprofloxacin, ceftriaxone, ofloxacin, perfloracin, cotrimoxazole, and cefuroxime. All the subjects with significant bacteriuria were treated using appropriately sensitive antibiotics.

Statistical analysis

Difference in proportion was evaluated using the Chi-square test. Statistically significant was achieved at $P < 0.05$.

Results

Of the total of 109 patients enrolled in the study, 83(76.1%) had significant bacteriuria (10⁵cfu/ml). Of the 83 subjects with significant bacteriuria 9(10.8%) had clinical features suggestive of UTI such as fever and particularly suprapubic pain/tenderness. The prevalence of bacteriuria was significantly higher among individuals aged less than 40 years old and was highest among those aged 21-30years (90.3%)($\chi^2=13.46$; $P<0.05$) (Table 1). The highest prevalence of bacteriuria was found among subjects who have had more than seven deliveries (85.0%) and those whose labour duration lasted above 48hours (76.7%), although the differences in the trend were not statistically significant ($\chi^2=1.19$; $P>0.05$ and $\chi^2=0.04$; $P>0.05$ respectively) (Table 1). The rate of bacteriuria was least among women with less than one year duration of urine leak (54.5%) and the bacteriuria rate ranged from 69.2% to 89.6% for those whose urine leak duration was more than one year. The difference in the trend was not statistically significant ($\chi^2=6.63$; $P>0.05$).

Table 1: Assessment of relationship between bacterial infection and demographic, gynaecological, obstetrics, anthropometric and haematological parameters of VVF patients in Nigeria

Parameter	Number Screened Number (%) with positive urine culture (significant bacteriuria)	
Age (year)		
≤ 20	5	4 (80.0)
21 – 30	31	28 (90.3)
31 – 40	26	22 (84.6)
41 – 50	20	15 (75.0)
≥51	27	14 (51.9)
Total	109	83 (76.1)
Number of delivery		
1 – 2	50	37 (74.0)
3 – 4	22	16 (72.7)
5 – 6	17	13 (76.4)
≥7	20	17 (85.0)
Total	109	83 (76.1)
Duration of labour (hours)		
≤ 24	16	12 (75.0)
25 – 48	36	27 (75.0)
> 48	57	44 (77.2)
Total	109	83 (76.1)
Duration of VVF(years)		
< 1	11	6 (54.5)
1 – 5	28	21(75.0)
6 – 10	29	26 (89.6)
11 – 15	15	12 (80.0)
≥16	26	18 (69.2)
Total	109	83 (76.1)
Anatomic location of fistula		
Intra cervical	18	15(83.3)
Juxta cervical	24	16(66.7)
Mid vaginal/ Angular	28	20(71.4)
Sub urethral	39	32(82.1)
Total	109	83 (76.1)
Blood group		
A	23	16 (69.6)
B	16	11 (68.8)
O	67	53 (79.1)
AB	3	3 (100)
Total	109	83 (76.1)
Height (m)		
≤ 1.43	48	32(66.7)
1.44 – 1.53	29	21 (72.4)
1.54 – 1.63	19	17 (89.5)
≥ 1.64	13	13 (100)
Total	109	83 (76.1)
Weight (kg)		
< 40	33	29 (87.9)
41 – 50	37	31 (83.8)
51 – 60	23	13 (56.5)
> 61	16	10 (62.5)
Total	109	83 (76.1)

Bacteriuria prevalence was highest among patients with intra cervical fistula (83.3%) and least among women with juxta cervical fistula (66.7%), but the difference was not statistically significant ($\chi^2=2.81$; $P>0.05$). Bacteriuria prevalence was highest among women of blood group AB (100%), the least was recorded among their counterparts with blood group B (68.8%), but there was no significant difference in the trend ($\chi^2=1.87$; $P>0.05$). Bacteriuria rate was significantly higher among women whose heights were more than 1.53metres (ranging from 89.5% to 100%) ($\chi^2=8.55$; $P<0.05$) and those whose weights were less than 51kilogramm (ranging from 83.8% to 87.9%)($\chi^2=10.01$; $P<0.05$) (Table 1).

Table 2: Spectrum of bacteria isolated from the urine of VVF patients in Nigeria

Bacteria isolate	Number (%) of bacteria isolated
<i>Escherichia coli</i>	34 (41.0)
<i>Klebsiella species</i>	15 (18.1)
<i>Proteus species</i>	18 (21.7)
<i>Staphylococcus aureus</i>	2 (2.4)
<i>Pseudomonas species</i>	13 (15.7)
<i>Streptococcus faecalis</i>	1 (1.2)
Total	83(76.1)

Six different bacteria species and *Candida albicans* were isolated from subjects. Of the total of 86 bacterial isolates, the highest were *Escherichia coli* (41.0%), *Proteus species* (21.7%), and *Klebsiella species* (18.1%) (Table 2).

Table 3: Antibiotic sensitivity profile of bacteria isolated from the urine of VVF patients in Nigeria

Bacteria isolate	Susceptibility to antibiotics tested (%)						
	Gent	Cipro	Ceftria	Oflox	Perflox	Cotrim	Cefurox
<i>Escherichia coli</i>	20 (58.8)	25 (73.5)	19 (55.9)	17 (50.0)	7 (10.3)	2 (5.9)	2 (5.9)
<i>Klebsiella species</i>	8 (53.3)	8 (53.3)	8 (53.3)	7 (46.7)	2 (13.3)	1 (5.6)	0 (0.0)
<i>Proteus species</i>	12 (66.7)	13 (72.2)	11 (61.1)	8 (44.4)	5(27.8)	3 (16.7)	2 (11.1)
<i>Staphylococcus aureus</i>	1 (50.0)	2 (100)	1 (50.0)	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)
<i>Pseudomonas species</i>	4 (30.8)	6 (46.2)	5 (14.8)	4 (30.8)	2 (15.4)	0 (0.0)	0 (0.0)
<i>Streptococcus faecalis</i>	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Key: Gent(Gentamicin), Cipro(Ciprofloxacin), Ceftria(Ceftriaxone), Oflox(Ofloxacin), Perflox(Perfloxacin), Cotrim(Cotrimoxazole), Cefurox(Cefuroxime).

The bacterial isolates were resistance to many of the antibiotics assessed (Table 3). The antibiotic susceptibility test indicates that in most cases more than 50% of the bacterial isolates were resistant to antibiotics tested. The highest level of resistance was observed with perfloxacin, cotrimoxazole and cefuroxime, while the highest level of susceptibility was observed with ciprofloxacin (Table 3).

Discussion

The result of this assessment clearly indicates that the presence of asymptomatic bacteriuria among women with VVF (76.1%) in south eastern Nigeria is unacceptably high. Earlier reports from other parts of Nigeria had indicated that VVF patients were highly susceptible to bacterial colonization of the genitourinary system^{11,16,30,31}. Although a number of studies have indicated that asymptomatic bacteriuria is rarely associated with significant adverse outcomes, the important exceptions have been identified to include pregnant women, individuals undergoing invasive genitourinary procedures (eg., VVF surgery), and renal-transplant recipients in the early post-transplantation period^{32,33,34}. Hence in VVF patients the importance of the treatment of bacteriuria cannot be over stated due to the

high potential of the development of UTI. Studies in diverse groups including VVF patients have consistently confirmed that patients with asymptomatic bacteriuria are at increased risk for symptomatic urinary infection^{16,21,32}.

The prevalence of bacteriuria in this study was significantly higher among individuals of younger age. A number of previous population based studies have indicated a rise in the prevalence of asymptomatic bacteriuria with age^{35,36,37}. However, among a population of VVF patients a different pattern in the relationship between age and prevalence of bacteriuria is not a surprise occurrence. A similar finding to ours was previously observed in a study conducted in Northern Nigeria among VVF patients¹⁶. The high microbial colonization of the younger patients as observed in this study may be attributed to their low level of personal hygiene arising from their inexperience to manage their VVF condition. Nevertheless further studies are required to properly elucidate the relationship between bacteriuria and age in VVF patients.

The highest prevalence of bacteriuria was found among subjects who have had more than seven deliveries, those whose labour duration lasted above 48hours, those of blood group AB. The possible reasons for this is not apparently clear, and may have occurred purely by chance since no statistically significant difference was observed in the trend. A more complex study design may be required to provide a better understanding and interpretation. The rate of bacteriuria was least among women with less than one year duration of urine leak. Although the difference in the trend was not statistically significant, the longer duration of leak among individuals whose VVF condition was older could have created more time for bacterial colonization.

Bacteriuria prevalence was highest among patients with intra cervical fistula and least among women with juxta cervical fistula. The reason for this finding was obscure and may be a chance occurrence since there was no statistically significant difference in the trend. Moreover to the best of our knowledge there is currently no previous work that has assessed the relationship between types of VVF and bacteriuria. A more complex study design is however required to provide more insight into any possible relationship existing between bacteriuria and VVF type. Interestingly, bacteriuria rate was significantly higher among women with lower weights (less than 51kg). A number of studies have associated low adult weight with an increased risk of infection diseases including UTI^{38,39,40}. The higher rate of bacteriuria among low weight individuals may indicate malnourishment which reduces the ability of affected individuals to contain infections.

The commonest bacterial isolates in this study were *Escherichia coli*, *Proteus* species, and *Klebsiella* species. These bacterial agents were also the most frequently occurring species in similar previous studies in Nigeria VVF patients^{16,30}. *Escherichia coli*, was the most predominant isolate in this study and this is consistent with a vast majority of studies which described it as the bacterium most commonly associated with asymptomatic bacteriuria in women^{16,37,41}, and also the most predominant bacteria species responsible for post-operative urinary tract

infection among women who had undergone urogenital surgery including VVF and caesarean section cases²². It is worth noting that the bacterial isolates showed a high level of resistance to the antibiotics tested. Antibiotic resistance is a major public health problem in Nigeria as in most developing countries where dysfunctional health services, inadequate drug supplies, non-adherence to treatment strategies, self-medication, and dubious drug quality continue to favor the emergence and persistence of antibiotic resistance⁴².

In conclusion it is pertinent to state that the prevalence of asymptomatic bacteriuria among the VVF patients in the present study is rather too high and this should not be neglected in the management of VVF patients. This is to prevent the possible development of UTI and pyelonephritis which might not only result into post-operative complications but could increase the risk of infections of the urinary system. The findings of this study equally suggest that the intake of at least 6litres of fluid for a minimum of 48hours may not be sufficient to reduce the microbial load of the urine in clients with VVF.

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