

THE PREVALENCE AND BACTERIOLOGY OF ASYMPTOMATIC BACTERIURIA AMONG ANTENATAL PATIENTS IN NNAMDI AZIKIWE UNIVERSITY TEACHING HOSPITAL NNEWI; SOUTH EASTERN NIGERIA

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ABSTRACT

Background: Urinary tract infection in pregnancy leads to poor pregnancy outcome. Diagnosis and treatment of asymptomatic bacteriuria markedly improves pregnancy outcome as well as reduce the incidence of acute pyelonephritis.

Objective: To determine the prevalence and bacteriology of asymptomatic bacteriuria among Antenatal patients in our centre, and to know if routine screening will be justifiable.

Materials and Methods: This was a prospective study carried out between April and August 2008. Sample size was statistically determined. Women who consented were interviewed and mid stream urine samples were collected and processed in the microbiology laboratory, using standard microbiological methods.

Results: Out of 357 women studied, 65(18.21%) had significant bacteriuria. *Escherichia coli* was the commonest isolate (25.6%), while *proteus mirabilis* was the least frequent isolate (3.66%). Women in third trimester had the highest prevalence (25.68%) while those in the first trimester had the least (15.79%). Women that had only primary education had the highest prevalence (27.50%) while those that had tertiary education had the least prevalence (21.10%).

Conclusion: The prevalence of significant asymptomatic bacteriuria among the women studied was high. Screening of all the pregnant women and treatment will reduce the incidence and complications of overt urinary tract infection in pregnancy among these women.

Key Words: Significant Bacteriuria, Prevalence, Antenatal women.

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INTRODUCTION

Pregnancy gives rise to several physiological changes resulting in immuno-suppression. Studies have shown that T and B lymphocyte counts do not change in pregnancy but their function is suppressed¹. Furthermore, pregnant women in the third trimester demonstrated a decrease in polymorphonuclear leukocyte adherence. This may explain the increased incidence of infection in pregnant women². The pressure effect of the growing uterus on the ureters and the smooth muscle relaxing effect of progesterone lead to relative stasis of urine in the upper urinary tract, which encourages bacteriuria. By the third trimester up to 97% of women show evidence of stasis or hydronephrosis³. Significant bacteriuria is generally defined as the presence of at least 10⁵ colony forming units of bacteria in 1ml of mid stream urine sample^{4,5}. Counts less than this or with two or more organisms indicate contamination rather than infection⁴.

Asymptomatic bacteriuria is the presence of significant bacteriuria in the absence of symptoms of urinary tract infection such as fever associated with loin pain with or without dysuria and frequency of micturition.

Acute pyelonephritis leads to a significant increase in prematurity rate⁶.

The American College of Obstetrics and Gynaecology (ACOG) recommends that a urine culture be carried out on pregnant women on their first antenatal visit. This will help to identify the pregnant women with asymptomatic bacteriuria for the purposes of early intervention⁷. A repeat urine culture should be done during the third trimester since the urine of treated women may not remain sterile through out pregnancy⁷.

A large scale study in a Teaching Hospital in Barcelona Spain concluded that screening and treatment programmes for asymptomatic bacteriuria during pregnancy reduces the risk of pyelonephritis in a population with moderate to high prevalence of bacteriuria⁸. Other studies confirm the usefulness of screening and treatment programmes in preventing

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cases of acute pyelonephritis^{9,10}.

Some of the fetal complications of acute pyelonephritis include premature labour, intra-uterine growth restriction and possibly intra-uterine fetal death¹¹.

Some possible maternal complications include Chronic pyelonephritis, anaemia and septicaemia¹².

There is currently no routine bacteriuria screening programme for antenatal patients in our Centre because there is paucity of documented information as regards the prevalence in the area. This study will fill this information gap for this environment.

PATIENTS AND METHOD

Study Population:

This prospective study was carried out in the antenatal clinic of Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi from April to August 2008 after ethical approval was obtained from the Hospital's research ethical committee.

The women were recruited longitudinally from the booking clinic after counseling and obtaining consent.

The sample size was derived using Yamane's (1964) formula for determining the sample size of finite population:

$$n = N / (1 + Ne^2)$$

Where n = desired sample size

e = maximum acceptable margin of error

N = population

I = a theoretical constant.

From the Medical records department of NAUTH, the average number of women booked from 2005 to 2007 was 3300 per year.

Using the formula, the sample size (n) was 356.75676 (Approximately 357).

Methodology:

Proper instruction on how to collect urine sample was given to the patients, thereafter midstream urine specimens were collected using universal sterile containers. This was immediately sent to the microbiology laboratory of NAUTH for processing using the standard microbiological methods¹²

Bacteriuria was considered significant when at least 10⁵ colony forming units of a single pathogen per milliliter of urine was demonstrated, (10⁵CFU/ml of urine).

RESULTS

Asymptomatic bacteriuria among antenatal patients in NAUTH was determined. Out of 357 samples evaluated, 65(18.21%) had significant bacteriuria and 17(4.76%) had candiduria.

Co infection of candida and bacteria was observed in 7 urine samples.

The most frequent of the bacteria was Escherichia Coli (25.62%) and the least was proteus mirabilis

(3.66%).Table1

Most of the isolates (47) were got in the third trimester, 29 in the second trimester and 6 in the first trimester.

It was observed that the higher the literacy level, the lower the incidence of bacteriuria as those with tertiary education had percentage prevalence of 21.1%, secondary education 23.08% and primary education 27.5%.

The incidence was also affected by the age group of the patients. The youngest age group, 20-24years had the least incidence 21.67%, while the oldest age group (40years and above) had the highest incidence at 42.86% as seen in table 2.

The antibiotic susceptibility patterns of the isolates was determined. This is shown in table 3. Ceftriaxone was the most susceptible of all the drugs used (75.38%), followed closely by Clindamycin 72.31%, with Ampicillin/Cloxacillin being the least susceptible 23.07%.

Table 1: **Distribution of Isolates.**

Code	Isolates	No. of Isolates	% of Isolates	Prevalence Rate %
A	Escherichia coli	21	25.62	5.88
B	Staphylococcus aureus	17	20.73	4.76
C	Candida albicans	17	20.73	4.76
D	Staphylococcus saprophyticus	13	15.85	3.64
E	Klebsiella aerogenes	11	13.41	3.08
F	Proteus mirabilis	3	3.66	0.84
Total		82	100.00	

Table 2: **Distribution of Isolates by Age Group.**

Age Group (Years)	Total No. of Isolates	Number of Sample Studies	Percentage
20 -24	13	60	21.67
25 -29	30	140	21.43
30 -34	28	123	22.76
35 -39	8	27	29.63
40 and above	3	7	42.86
Total	82	357	

Table 3: Susceptibility Pattern of the Isolates.

Drug	% SENSITIVE					Total Number of Isolates Sensitive	Total % Sensitive
	<i>E. Coil</i>	<i>Staph. Aureus</i>	<i>Staph. Saprophyticus</i>	<i>Klebsiella Aerogenes</i>	<i>Proteus Mirabilis</i>		
Erythromycin	57.14	47.06	38.46	45.45	66.67	32	49.23
Amoxicillin	47.62	35.29	53.85	36.36	66.67	29	44.62
Clindamycin	66.67	64.71	84.62	72.73	100.00	47	72.31
Amoxicillin /Clavulanate	57.14	47.06	53.85	63.64	66.67	36	55.38
Co-trimoxazole	42.86	29.41	23.08	36.36	33.33	22	33.84
Nalidixic acid	33.33	17.65	30.77	45.45	66.67	21	32.31
Cephalexin	33.33	17.65	46.15	00.09	66.67	19	29.23
Cefuroxime	47.62	52.94	38.46	27.27	66.67	29	44.62
Ceftriaxone	85.71	64.71	100.00	72.73	100.00	49	75.38
Gentamycin	66.67	41.18	76.92	54.54	66.67	39	60.00
Ampicillin/ Cloxacillin	23.81	11.76	38.46	18.18	33.33	15	23.07
Nitrofurantoin	52.38	17.65	30.77	27.27	66.67	23	35.38

DISCUSSION

The prevalence of asymptomatic bacteriuria in this study was 18.21%. This is higher than 12% reported by workers in University College Hospital (UCH) Ibadan¹⁴ and 15% reported in a similar study at University of Nigeria Teaching Hospital (UNTH) Enugu¹⁵. It is also higher than 14.1% reported by Okonofua and his team in 1989 at Obafemi Awolowo University Teaching Hospital Ile-ife¹⁶.

Escherichia Coli was the commonest organism Isolated in this study (25.62). This is consistent with the findings in the UNTH Enugu and UCH Ibadan

studies^{14,15}.

Overall, the patients with microbial isolates were 82, but asymptomatic bacteriuria was found in 65 patients (18.2%), while candiduria was found in 17 (4.76%). Candiduria was not totally unexpected in the study group in view of the higher incidence of vaginal candidiasis in pregnant women when compared to the non pregnant subjects¹⁷.

It is expected that the incidence of candiduria among the pregnant population will rise with increasing numbers of human immunodeficiency virus infected mothers in the referral centres¹⁸.

The least educated women (with primary education) had the highest incidence (27.5%), this may be as a result of poor knowledge and practice of personal hygiene in pregnancy. The older women had higher incidence in this study. It is quite possible that pre-existing renal disease which may encourage bacteria multiplication may be commoner in them because of age.

When they were grouped in trimesters of pregnancy, women in the third trimester had the highest incidence. The pressure effect of a much bigger uterus on the ureters, the increasing smooth muscle relaxing effect of pregnancy hormones and the pressure on the bladder from the descending presenting part, may all lead to stasis of urine, which will encourage bacteria multiplication. Further more, the immunosuppressive effect of pregnancy may be most pronounced in third trimester.

From the sensitivity testing of the isolates ceftriaxone was discovered to be the most effective of all the drugs tested, having 75.38% sensitivity. Ampicillin/Cloxacillin had the least sensitivity at 23.07%. Ampicillin was regarded as the first line antibiotic for empirical treatment of urinary tract infection in pregnancy because of its safety, availability and low cost¹². However, the uncontrolled, frequent use/ misuse of Ampicillin/Cloxacillin in Nigeria is likely to have contributed to the emergence of widespread resistance to the drug¹⁹.

CONCLUSION

The prevalence of asymptomatic bacteriuria among the pregnant population in this environment is high. Screening of all the pregnant women and treatment of those with significant bacteriuria will reduce the incidence of acute pyelonephritis with its complications among our pregnant women.

From this study, Ampicillin or ampicillin/cloxacillin is no longer suitable (at least in this environment) as first line drug for the empirical treatment of bacteriuria or overt urinary tract infection in pregnancy.

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