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

*AN Oli, **CI Okafor, ***EC Ibezim, ****CN Akujiobi, *****MC Onwunzo

Departments of *Pharmacy, NAUTH, Nnewi, **Obstetrics and Gynaecology, ***Pharmaceutics, University of Nigeria, Nsukka, ****Microbiology Nnamdi Azikiwe University Teaching Hospital, Nnewi.

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 *P. 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.

(introduced 16 December 2009)

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 suppressed. Furthermore, pregnant women in the third trimester demonstrated a decrease in polymorphonuclear leukocyte adherence. This may explain the increased incidence of infection in pregnant women. 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 hydronephrosis. Significant bacteriuria is generally defined as the presence of at least 10° colony forming units of bacteria in 1ml of mid stream urine sample. Counts less than this or with two or more organisms indicate contamination rather than infection.

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 rate.

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 intervention. A repeat urine culture should be done during the third trimester since the urine of treated women may not remain sterile through out pregnancy.

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 bacteriuria. Other studies confirm the usefulness of screening and treatment programmes in preventing...
cases of acute pyelonephritis. Some of the fetal complications of acute pyelonephritis include premature labour, intra-uterine growth restriction and possibly intra-uterine fetal death.

Some possible maternal complications include Chronic pyelonephritis, anaemia and septicaemia. 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) formular for determining the sample size of finite population:

\[ n = \frac{N}{1 + Ne^2} \]

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 formular, 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 methods. Bacteriuria was considered significant when at least \( 10^5 \) colony forming units of a single pathogen per milliliter of urine was demonstrated, (10^5 CFU/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%). Table 1 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, 20-24 years had the least incidence 21.67%, while the oldest age group (40 years 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>
<thead>
<tr>
<th>Code</th>
<th>Isolates</th>
<th>No. of Isolates</th>
<th>% of Isolates</th>
<th>Prevalence Rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Escherichia coli</td>
<td>21</td>
<td>25.62</td>
<td>5.88</td>
</tr>
<tr>
<td>B</td>
<td>Staphylococcus aureus</td>
<td>17</td>
<td>20.73</td>
<td>4.76</td>
</tr>
<tr>
<td>C</td>
<td>Candida albicans</td>
<td>17</td>
<td>20.73</td>
<td>4.76</td>
</tr>
<tr>
<td>D</td>
<td>Staphylococcus saprophyticus</td>
<td>13</td>
<td>15.85</td>
<td>3.64</td>
</tr>
<tr>
<td>E</td>
<td>Klebsiella aerogenes</td>
<td>11</td>
<td>13.41</td>
<td>3.08</td>
</tr>
<tr>
<td>F</td>
<td>Proteus mirabilis</td>
<td>3</td>
<td>3.66</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Total 82 100.00

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Total No. of Isolates</th>
<th>Number of Sample Studies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>13</td>
<td>60</td>
<td>21.67</td>
</tr>
<tr>
<td>25-29</td>
<td>30</td>
<td>140</td>
<td>21.43</td>
</tr>
<tr>
<td>30-34</td>
<td>28</td>
<td>123</td>
<td>22.76</td>
</tr>
<tr>
<td>35-39</td>
<td>8</td>
<td>27</td>
<td>29.63</td>
</tr>
<tr>
<td>40 and above</td>
<td>3</td>
<td>7</td>
<td>42.86</td>
</tr>
</tbody>
</table>

Total 82 357

Table 1: Distribution of Isolates.

Table 2: Distribution of Isolates by Age Group.
Table 3: Susceptibility Pattern of the Isolates.

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

**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) Ibadan and 15% reported in a similar study at University of Nigeria Teaching Hospital (UNTH) Enugu. It is also higher than 14.1% reported by Okonofua and his team in 1989 at Obafemi Awolowo University Teaching Hospital Ile-ife. 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.

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 subjects. 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 centres.
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/Cloxacinill had the least sensitivity at 23.07%. Ampicillin was regarded as the first line antibiotic for empirical treatment of urinary tract infection because of its safety, availability and low cost. However, the uncontrolled, frequent use/misuse of Ampicillin/Cloxacinill in Nigeria is likely to have contributed to the emergence of widespread resistance to the drug.

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/cloxacinill 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.

REFERENCES