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Prevalence of *Neisseria gonorrhoea* in Female Patients Attending Clinics in the Federal Capital Territory (FCT) - Abuja, Nigeria

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With 5 tables

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ABSTRACT

A study designed to determine the prevalence of *Neisseria gonorrhoea* in female patients as well as the susceptibility of the recovered isolates to commonly used antibiotics was undertaken in Abuja. Beta-lactamase production by these isolates was also determined using the filter-paper acidometric method. The survey involved two hundred and twenty-one patients seen at three selected General Hospitals, in the Federal Capital Territory located in Garki, Wuse and Nyanya districts. The study involved collection of samples from patients attending antenatal care clinics and sexually transmitted diseases clinics. Of the 221 endocervical swabs collected from the patients, 16 (7.2%) yielded *N. gonorrhoea*, with the age group within 21 - 25 years being mostly affected (7: 11.3%) followed by 4 (1.8%) and 3 (1.4%) in the 26 - 30 years and 31 - 35 years age brackets, respectively. Also, 7 (43.8%) of the total isolates were Beta-lactamase producing strains. Isolates were very sensitive to peflacin, ceftriaxone, cefotaxime, and spectinomycin but highly resistant to penicillin, erythromycin and tetracycline. This study demonstrates the emergence of penicillinase-producing strains of *N. gonorrhoea* in the FCT, therefore making it unreasonable to recommend Penicillin G as a drug of choice in the treatment of this disease condition.

Key words: Beta-lactamase, FCT, *Neisseria gonorrhoea*, prevalence

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Introduction

Sexually transmitted diseases (STDs), particularly gonorrhoea constitute a major medical problem in Nigeria and many other developing countries of tropical Africa [Osoba, 1981]. Even though there are, at present no reliable statistical data on the problem in Nigeria and indeed many of the developing countries of tropical Africa, the few reports suggest that the prevalence of these infections is high [Adelusi, 1989b].

The little information that is available has confirmed that there is a considerable reservoir of infection among some of the female population in Nigeria. The high rate of unemployment coupled with a high rate of prostitution provided by the removal of the fear of unwanted pregnancies following the increasing use of contraception have been highlighted in various studies [Hewitt, 1970; Onifade and Osoba, 1972; Adelusi, 1989a].

Reports in the literature indicate that between 70 - 80% of women found to be infected have no symptoms and even in those who have, these are usually mild and easily neglected [Adelusi, 1989b], hence complications of

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genitourinary gonorrhoea in females are common. Gonorrhoea remains a major cause of morbidity causing acute salpingitis, pelvic inflammatory disease, ophthalmia neonatorum in infants born to infected mothers as well as being an independent co-factor in the acquisition of human immune-deficiency virus (HIV) [Laga *et al.*, 1989]. This report aims at highlighting the true position of this infection in the FCT following reported cases of ophthalmia neonatorum and other complications of gonorrhoea in the hospitals considered in this report.

Materials and Methods

Study population

The study population was drawn from patients seen at the three selected General Hospitals in the Federal Capital Territory, Abuja, Nigeria. These hospitals are located in Garki, Wuse and Nyanya districts. Two hundred and twenty-one antenatal care women and those attending sexually transmitted disease clinics were involved in the study. They were aged between 15 and 50 years.

Laboratory studies

Collection of specimens

Endo-cervical swabs were collected from each of the patients used in this study by a medical officer in the different hospitals using a sterile speculum. Information was also obtained from each of the subjects by one of us regarding, age, educational status, occupation, use of contraceptives among others, using a questionnaire.

Processing of samples

Samples were processed according to the guidelines on laboratory methods for the diagnosis of *Neisseria gonorrhoea* by the Centre for Disease Control (CDC), Atlanta, Georgia, USA.

- (a) *Macroscopy*: This involved the visual examination of swabs made from endo-cervix to determine its colour and consistency.
- (b) *Isolation of Neisseria gonorrhoea*: Material from the endo-cervix was collected and inoculated onto modified chocolate agar plates immediately. The chocolate agar was made selective by incorporating collistin (6 mg/l^{-1}), lincomycin (1 mg/l^{-1}), trimethoprim (5 mg/l^{-1}) and nystatin ($12.5 \text{ units l}^{-1}$). The agar plates were then incubated at 37°C in a candle extinction jar enriched with 5% CO_2 in a moist atmosphere. The plates were examined daily for 2 days for characteristic growth. All suspected colonies were subjected to Gram staining and further sub-cultured onto chocolate agar for pure isolates and prior to biochemical characterization.
- (c) *Identification of isolates*: Identification of isolates was based on a set of biochemical tests - oxidase reaction with *Pseudomonas aeruginosa* as positive control, and rapid carbohydrate utilization test as described by Young [1978].
- (d) *Beta-lactamase production*: This was done using the method of Sng *et al.* [1981].
- (e) *Antimicrobial susceptibility testing*: Sensitivity of isolates to antimicrobial agents was determined on chocolate agar plates using the disc diffusion method of Cruickshank [1975]. From a pure culture of the isolate to be tested, a uniform streak was made on the agar plate. The antibiotic discs were then placed on the plates and incubated at 37°C overnight in a candle extinction jar enriched with 5% CO_2 in a moist atmosphere. Interpretation of results was done using the zone sizes. Zones of inhibition of $\geq 18 \text{ mm}$ were considered sensitive, 13 - 17 mm, intermediate, and $<13 \text{ mm}$ resistant. All isolates were tested for sensitivity to the following antibiotics, tetracycline ($50 \mu\text{g}$), erythromycin ($10 \mu\text{g}$), spectinomycin ($100 \mu\text{g}$), cefotaxime ($30 \mu\text{g}$), ceftriaxone ($30 \mu\text{g}$), peflaxacin ($30 \mu\text{g}$) and cotrimoxazole ($25 \mu\text{g}$).

Statistical analysis

The data obtained were subjected to Chi-squared test using a probability of $p=0.05$ as the level of significance.

Results

Table 1 shows the age distribution of the study population as well as the number positive for *N. gonorrhoea*. From the study, a total of 16 (7.2%) patients had *N. gonorrhoea* with the age group 21 - 25 years mostly affected (7: 11.3%).

Table 2 shows the prevalence of *N. gonorrhoea* among contraceptive users. Taking into consideration the sample sizes used for each, there were more cases in the contraceptive users (6: 14.3%) as against 10 (5.6%) in the non-users. The difference is, however, not statistically significant ($p>0.05$). Most of the isolates (13: 10.9%) were associated with vaginal discharge (Table 3). Again the prevalence of *N. gonorrhoea* in relation to marital status of the female patients studied showed that the highest incidence was among single ladies (8: 8.3%) compared with the

married (2: 1.7%). The sample sizes for those who were either divorced or separated was too small for meaningful comparison (Table 4).

Table 1. Age distribution of patients with *N. gonorrhoea* from 3 hospitals in the Federal Capital Territory (FCT)

Age (yr)	No examined	No positive	%
15 - 20	34	2	(5.6)
21 - 25	62	7	(11.3)
26 - 30	63	4	(6.4)
31 - 35	30	3	(10.0)
36 - 40	20	0	-
41 - 45	7	0	-
46 - 50	5	0	-
Total	221	16	(7.2)

Table 2. Prevalence of *N. gonorrhoea* among contraceptive users from 3 hospitals in FCT

Characteristic	No examined	No. positive	%
Do not use contraceptive	179	10	(5.6)
Use contraceptive	42	6	(14.3)

Table 3. Prevalence of *N. gonorrhoea* in relation to presence or absence of vaginal discharge from 3 hospitals in FCT

Characteristic	No examined	No. positive	%
With discharge	119	13	(10.9)
Without discharge	109	3	(2.9)
Total	221	16	(7.2)

Table 4. Prevalence of *N. gonorrhoea* in relation to marital status in female patients from 3 hospitals in FCT

Marital status	No. examined	No. positive	%
Single	96	8	(8.3)
Married	116	2	(1.7)
Divorced	5	1	-
Separated	5	5	-

In Table 5, 7 (43.8%) of the isolates were penicillinase-producing while all the isolates were 100% sensitive to cefotaxime, ceftriaxon, spectinomycin and peflacin.

Discussion

A total of 221 females were involved in this study in which 16 (7.2%) were found to be infected with *N. gonorrhoea*. The highest incidence of 7 (3.2%) occurred within the age group 21 - 25 years followed by 4 (1.8%) and 3 (1.4%) in the 26 - 30 years and 31 - 35 years age bracket, respectively. These observations previously stem from the fact that these age groups are the most sexually active. Reports in the literature indicate that genital infections are common in women who are sexually active, and also that the frequency of genital infections in infected women is somewhat proportional to the sexual activity of the subject [Westrom and Mardh, 1975]. The zero percent recorded for the older women could be attributed to less sexual activity hence a reduced risk of acquiring the infection.

Table 5. *In vitro* antibiotic susceptibility pattern and beta-lactamase production of isolated *N. gonorrhoea* strains in females from 3 hospitals in FCT (n = 16)

Antibiotic (μ g)	No. susceptible	%
Erythromycin (10)	3	(18.8)
Tetracycline (50)	7	(43.7)
Spectinomycin (100)	16	(100.0)
Cefotaxime (30)	16	(100.0)
Ceftriaxone (30)	16	(100.0)
Peflacin (30)	16	(100.0)
Co-trimoxazole (25)	8	(50.0)

Beta-lactamase production	No. positive (%)	No negative (%)
	7 (43.8)	9 (56.3)

The prevalence of gonococcal infection in patients with vaginal discharge was 10.9% as against 2.9% for those with no discharge. These findings further suggest a relationship between infection and vaginal discharge ($p < 0.05$).

The incidence of *N. gonorrhoea* was found to be high among single ladies. A possible explanation could be that they could be more promiscuous compared to the married ladies.

The strains of *N. gonorrhoea* isolated were found to be highly resistant to penicillin G, the oldest of the beta lactam antibiotics examined. The prevalence of penicillase producing *N. gonorrhoea* in this part of the world has been on the increase since the first report by Bello in 1982. A report by Obaseki-Ebor and Oyeide in 1985 shows that with an initial prevalence rate of 12.5% in 1979, the figure rose to 50% in 1981 at Ibadan and 87% in 1985 in Benin City. In 1986, a prevalence of 70% was recorded at Ilorin by Odugbemi and Adetoro [1986] while the prevalence rate of 83.3% in Jos was reported by Bello *et al.* [1996]. These figures are said to be some of the highest in the world. Our figure of 43.8% is less than the figures quoted above. Many reasons could have accounted for this observations. It is likely that the method used might have contributed to the low figure. The relative high prevalence of beta-lactamase producing *N. gonorrhoea* observed in this study further corroborates the evidence that resistance of this organism to penicillin is due to the production of penicillinase.

Thus, the result of this study, like in many other countries of the world, demonstrates the emergence of penicillinase-producing *N. gonorrhoea* (PPNG) in the FCT, therefore making it unreasonable to recommend penicillin G as a drug of choice in the treatment of gonorrhoea.

Spectinomycin, cefotaxime, ceftriaxone and peflacin were found to be highly effective against *N. gonorrhoea* isolates *in vitro*. Therefore, the use of these drugs for management of gonorrhoea in the FCT is indicated.

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