British Journal of Pharmaceutical and Medical Research Vol.01, Issue 03, Pg.218 - 222, November-December 2016

Available Online at http://www.bjpmr.org

BRITISH JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

DOI: In-Process Volume 01, Issue 03, November-December 2016

Research Article

Low Prevalence of *Neisseria gonorrhoeae* in Owerri, Nigeria

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ARTICLE INFO

Article History:
Received on 17rd September, 2016
Peer Reviewed on 28th October 2016
Revised on 18th November, 2016
Published on 02nd December, 2016

Keywords:
Neisseria gonorrhoeae, Low Prevalence, Nigeria

ABSTRACT

Gonorrhoeae is a purulent infection of the mucous membranes caused by the sexual transmission of the bacterium, *Neisseria gonorrhoeae*. It is a leading cause of pelvic inflammatory disease, which can result to complications such as tubal factor infertility, chronic pelvic pain, ectopic pregnancy and stillbirth. This study was designed to determine the prevalence of *Neisseria gonorrhea* in Owerri, Imo State Nigeria; as well as the susceptibility of the recovered isolates to commonly used antibiotics for the treatment of the disease. The survey involved 49 consenting patients seen at St. John's Medical Laboratory Owerri who were presenting with signs and symptoms of sexually transmitted disease. Urethra swaps specimens were collected from male patients while high vaginal swabs and endocervical swabs were collected from female patients respectively. The specimens were processed and analyzed for *Neisseria gonorrheae* using conventional microbiological techniques. Of the 49 specimens analyzed, only 1 (2.0%) urethra swap from a 38 years old man yielded *Neisseria gonorrheae.* Antibiotic susceptibility testing shows that the isolate was sensitive to ofloxacin, ciprofloxacin, azithromycin, and ceftriaxone but resistant to penicillin, tetracycline and doxycycline. Despite low rate of gonorrhea infection observed in this study, it is important to focus on high-risk populations (reproductive age group) because of the great physical and emotional costs of the disease. There is a need for a policy on routine screening for *Neisseria gonorrhoeae* since the treatment is available but the complications are dangerous to reproductive health.

INTRODUCTION:

Neisseria gonorrheae, the causative agent of the sexually transmitted disease, gonorrhea, is an obligate human pathogen that primarily infects the urogenital tract and cause male urethritis and female endocervicitis (WHO, 2010). The infection is transmitted from one person to another through vaginal, oral, or anal sex. Men have a 20% risk of getting the infection from a single act of vaginal intercourse with an infected woman; the risk for men that have sex with men is higher. Women have a 60–80% risk of getting the infection from a single act of vaginal intercourse with an infected man. A mother may also transmit gonorrhea to her newborn during childbirth; when affecting the infant's eyes, it is referred to as ophthalmia neonatorum. However, gonorrhea is not transmitted trough toilets or bathrooms (WHO, 2005). Half of women with gonorrhea are asymptomatic, whereas others have vaginal discharge, lower abdominal pain or pain with intercourse. Most infected men have symptoms such as urethritis associated with burning sensation with urination and discharge from the penis (WHO, 2005). Either sex may also acquire gonorrhea of the throat from performing oral sex on an infected partner, usually a male partner. Such infection is asymptomatic in 90% of cases, and produces a sore throat in the remaining 10%.

With the advent of sulfonamide in 1936 and penicillin in 1943, antibiotic therapy for the treatment of gonococcal infection led to a rapid decrease in gonorrhea prevalence. Then since the beginning of the 20th century, peaks of reported cases of gonorrhea occurred during World Wars 1 and II and following the "sexual liberation" of the late 1960s and early 1970s (Knapp and Rice, 1995). In the late 1980s, with the onset of the HIV epidemic and a coincident widespread use of barrier contraceptives, the incidence of gonococcal infection again declined (Aral and Holmes, 1999).In the absence of gonococcus screening program in the study area, little is known about the prevalence of gonococcal infection in Owerri, southeast Nigeria. To our knowledge, there is no data on the prevalence and antibiotics susceptibility pattern of *Neisseria gonorrheae* in the state. The STI surveillance system in the country is weak. This is because the pattern of reporting from health institutions is not uniform. Also drug resistance varies greatly among different regions. Therefore, having prevalence data as well as the drug susceptibility rate is important especially for prevention and control of infectious disease such as gonorrhea. The major objective of this study was to assess the prevalence of *Neisseria gonorrheae* and their antimicrobial susceptibility patterns among symptomatic and asymptomatic individuals in Owerri southeast Nigeria.

MATERIAL AND METHODS

Sample collection, Isolation and Identification *N. gonorrhoeae.*

Urethra swaps specimens were collected from male patients while high vaginal swabs and endocervical swabs specimens were collected from female patients respectively. The nature of the collected specimens were noted such as the colour, consistency and odour; the specimens were then examined under the low power (10x) and high power (40x) magnifications microscope for white blood cells, red blood cells, and epithelia cells. After the microscopic examinations, a presumptive diagnosis of *N. gonorrhoeae* was carried out using GC-Chocolate agar; the culture was incubated at 37˚C in a humid, 10% CO2-enriched atmosphere. Emergent colonies resembling *N. gonorrhoeae*, typical diplococci in pairs, tetrads or clusters under the microscope were subjected to further biochemical confirmatory tests for identification *N. gonorrhoeae.* The following confirmatory tests were carried out according to the method of Chessbrough (2000): Catalase test, oxidase tests and colistin resistance test. All sampling procedures were in accordance with guidelines of the National Health Research Ethics Committee, Nigeria (www.nhrec.net).

Antibiotic Susceptibility Testing.

Antibiotic susceptibility testing was carried out using Kirby-Bauer disk diffusion method on GC chocolate agar. 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% CO2 in a moist atmosphere. Interpretation of results was done using the recommendation of Clinical Laboratory Standard Institutes. The isolate was tested for sensitivity to the following antibiotics: ciprofloxacin (5 µg), doxycycline (30 µg), erythromycin (15 µg), penicillin (10 µg), gentamycin (10 µg) and tetracycline (5 µg), ceftriaxone (5 µg), ofloxacin (5 µg).

RESULTS AND DISCUSSION

A total of 49 clinical specimens were analyzed for *N. gonorrhoeae* in this study, of which 7 were from consenting males with urethral discharge or dysuria and 41 were from consenting female patients with vaginal discharge. After the presumptive *N. gonorrhoeae* identification tests and microscopy, four isolates were suspected to be *N. gonorrhoeae* which involved three endocervical swabs specimens from the females and one urethra swab specimen from a male patient. On further laboratory analysis and conducting of confirmatory tests on the four presumptive positive isolates, only one (1) isolate was identified as *N. gonorrhoeae* and the specimen was that of the male patient from the presumptive tests. The antibiotic susceptibility tests result shows that, the *N. gonorrhoeae* isolate was sensitivity to ofloxacin, ciprofloxacin, azithromycin, ceftriaxone, gentamycin and spectinomycin; but was resistant to penicillin, tetracycline and doxycycline.

In this study, the overall prevalence rate of *N. gonorrhoeae* among the study population was 2.0%, with the isolated strain being sensitive to most of the antibiotics tested. This result is comparable to what has been earlier reported in different part of Nigeria and elsewhere; 1.4% among women in Lagos University Teaching Hospital, Lagos, Nigeria (Bakere *et al* 1996), 1.3% among pregnant women in Ilorin, Nigeria (Aboyeji and Nwabuisi, 2003), 5.2% among pregnant women in Calabar, Nigeria (Usanga *et al.,* 2010), 3.2% in female patients attending clinics in the federal capital territory Abuja, Nigeria (Bassey *et al.,* 2000), 5% among undergraduate female students of University Of Port Harcourt, Nigeria (Wariso and Oboro, 2013) and 5.1% among symptomatic women in Hawassa Ethiopia (Mengistu *et al.,* 2013). However, our data is considerably lower than the 16.3% observed in patients from different hospitals in Kaduna State Nigeria (Jatau *et al,* 2003).

The possible reason of the low prevalence of *N. gonorrhoeae* observe in this study could be due to the effectiveness of programs and campaigns against HIV/AIDS, unprotected sex and STDs in general. It can also be attributed to the age bracket of the study population, which included young people in the Owerri metropolis who are most likely to be students and enlightened individuals, and therefore must have taken advantage of condoms for their protection against STDs. Due to the isolation of only one *N. gonorrheae* strain in the study, the data was extremely insufficient to conclusively establish an antibiotic susceptibility pattern for *N. gonorrheae* in Owerri, although the isolate showed sensitivity to ofloxacin, ciprofloxacin, azithromycin, and ceftriaxone, gentamycin, spectinomycin and resistance to penicillin, tetracycline and doxycycline, we cannot make any categorical statement about the susceptibility rate of the pathogen in Owerri. Nevertheless, the high resistance observed in penicillin and tetracycline concurs with other studies, which shows that prevalence of penicillase producing *N. gonorrheae* in Nigeria 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 Odugberni and Adetoro (1986), also the prevalence rate of 83.3% in Jos was reported by Bello *et al.* (1996) while Bassy *et al.*, (2000) reported 43.8% prevalence rate in FCT Abuja. Therefore, more surveillance is needed in Owerri to determine the actual rate of penicillase producing *N. gonorrheae* in the region.

CONCLUSION,

we recommend that public health officials should continue their good work in creating adequate awareness aimed at curtailing the spread of *N. gonorrheae*/STDs in general. Also, specialized clinics for STDs should be established to ensure proper control and prevention of *N. gonorrheae*.

Table 1. *Table showing the sex/sample type, age, microscopy and presumptive, N. gonorrheae identification*.

S/N	S/ST	AGE	MICROSCOPY	P.N.G.I
1	F/HVS	36	W =1-3, R = nil, E = +	_
2	F/HVS	47	W = 3-3, R = 0-2, E = ++	_
3	F/HVS	41	W =0-2, R = 2-4, E = +	_
4	M/US	37	W = 5-8, R = nil, E = +	_
5	F/HVS	33	W = 1-3, R = 5-7, E = +	_
6	F/HVS	23	W =0-2, R = 2-4, E =++	_
7	F/HVS	34	W = 10, R = 5, E = +	_
8	F/HVS	30	W =0-2, R =nil, E =+	_
9	F/ECS	31	W =4-6, R = 7-9, E = +++	_
10	F/HVS	25	W = 0-2, R = 0-2, E = +	_
11	M/US	40	W = 2-4, R = 0-3, E = +	_
12	F/ECS	27	W = 7-9, R = 3-5, E = +++	+
13	F/HVS	23	W = 0-2, R = 1-3, E = +	_
14	F/HVS	24	W =0-2, R = 0-2, E = ++	_
15	M/US	25	W = 1-2, R = nil, E = +	_
16	F/ECS	28	W = 8-10, R = 2-4, E = +++	+
17	F/HVS	27	W = 0-2, R = 0-2, E = +	_
18	F/HVS	29	W = 1-3, R =3-5, E = ++	_
19	F/HVS	41	W = 0-2, R = 5-7, E = +	_
20	F/HVS	35	W = 2-4, R = 3-5, E = ++	_

21	F/HVS	26	W = 6-8, R = 5-7, E = ++	_
22	M/US	29	W = 2-5, R = nil, E = +	_
23	F/HVS	34	W = 4-6, R = 5-7, E = +	_
24	M/US	29	W = 4-7, R = 1-2, E = +	_
25	F/HVS	23	W = 1-3, R = 2-5, E = ++	_
26	F/HVS	34	W = 3-5, R = nil, E = ++	_
27	F/HVS	23	W = 1-4, R = 0-2, E = +	_
28	F/HVS	33	W = 0-2, R = 2-4, E = ++	_
29	F/HVS	43	W = 10-12, R = 5-9, E = +++	_
30	F/HVS	21	W = 3-5, R = 3-5, E = ++	_
S/N	**S/ST**	**AGE**	**MICROSCOPY**	**P.N.G.I**
31	F/HVS	22	W = 1-3, R = 1-3, E = +	_
32	F/HVS	29	W = 2-4, R = 5-7, E = ++	_
33	M/US	38	W = 16-19, R = 1-3, E = +	+
34	F/HVS	25	W = 1-3, R = 0-2, E = +	_
35	F/HVS	26	W = 0-2, R = 3-5, E = +	_
36	F/HVS	29	W = 0-2, R = nil, E = +	_
37	F/HVS	28	W = 0-2, R = nil, E = +	_
38	F/HVS	27	W = 1-3, R = 2-5, E = ++	_
39	F/HVS	24	W = 0-3, R = 2-4, E = +	_
40	F/HVS	25	W = 1-3, R =3-5, E = ++	_
41	F/HVS	20	W = 1-4, R = 0-2, E = ++	_
42	F/ECS	44	W = 10-13, R = 3-5, E = +++	+
43	F/HVS	23	W = 1-3, R = 0-3, E = ++	_
44	F/HVS	20	W = 0-2, R = 3-5, E = ++	_
45	F/HVS	52	W = 1-3, R = 1-3, E = ++	_
46	F/HVS	23	W = 6-8, R =3-5, E = ++	_
47	F/HVS	50	W = 3-5, R = 2-4, E = ++	_
48	M/US	30	W = 3-5, R = nil, E = +	_
49	F/ECS	23	W = 10, R = 5, E = +++	_

KEYS: S/N=Serial number, S/ST=sex/sample type, M/US = male/urethra swab, F/ECV=female/endocervical swab, W=white blood cells, R=red blood cells, E=epithelia cells, P.N.G.I=presumptive *Neisseria gonorrhoeae* isolate, +=low presence, ++=moderate presence, +++=profuse presence

Table 2. Confirmatory test results.

S/N	S/ST	AGE	G.STAIN	OXIDAZE	SUPEROXOL	COLISTINE
1	M/US	38	+	+	4+	_
2	F/ECV	23	+	_	_	_
3	F/ECV	28	+	_	_	+
4	F/ECV	27	+	_	_	+

Tabular representation showing the sex/sample type, age, gram staining, oxidase test, superoxol test, colistin resistance test for the positive presumptive, *N. gonorrheae* identification.

KEYS:

S/N=Serial number, S/ST=sex/sample type, M/US = male/urethra swab, F/ECV=female/endocervical swab, G.STAIN=gram staining test, OXIDAZE=oxidase test, SUPEROXOL= seperoxol test, COLISTINE= colistine resistance test.

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