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Investigation of the pattern of antimicrobial sensitivity in Neisseria gonorrhoeae

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Abstract
Introduction and Objectives: There is a global epidemic of sexually transmitted illnesses. Annually, there are approximately millions of new instances recorded. Finding out how susceptible gonococcus is to different antibiotics and how often it is seen in STD clinic patients were the primary goals of the research.
Material and Methods: This study was prospective and observational. 40 patients who tested positive for gonococcus using gramme stained smear or culture at the Department of DVL, Nootan Medical College and Research Centre, Gujarat, India. This study was done between the February 2020 to January 2021. All patients had a standard history and clinical examination. Specimens were obtained based on the length of illness and the location of the gonococcal infection.
Results: 40 patients with gonococcal infection were thoroughly examined. In this study, 67.4% of patients were in the age category of 20-30 years, which is known for being sexually active and where other sexually transmitted diseases are also prevalent. The next predominant age group was 31-40 years old. 47.5% of the male participants in our study were single. Gonorrhoea infection was most common in individuals who have never been married, for both sexes, as indicated by the current study. Our study found that 52.5% of males had contact with commercial sex workers, who are considered the primary group responsible for transmitting sexually transmitted diseases.
Conclusion: Findings from the study show that there is a high prevalence of multidrug-resistant Neisseria gonorrhoeae in this area. Penicillin and Ciprofloxacin are of questionable utility in treating Gonorrhoea due to the fact that all strains have shown either reduced sensitivity or resistance to these medications.

Keywords: Antimicrobial, sensitivity pattern, Neisseria gonorrhoeae

Introduction
There is a global epidemic of sexually transmitted illnesses. Every year, there are approximately 340 million new cases recorded. At 40 million, or 5% of the population, new instances of sexually transmitted diseases occur annually in India. There are 5.13 million new HIV infections in India, contributing to the global total of 39.4 million people living with HIV/AIDS [1, 2]. One of the main ways that HIV can spread is through sexually transmitted diseases (STDs). That is why one of the main ways to keep HIV at bay is to prevent and control sexually transmitted diseases. There are two main types of sexually transmitted diseases: ulcerative and non-ulcerative versions. When compared to people who have never had an STD, the chance of contracting an HIV infection is five to seven times higher in those with ulcerative STDs and three to five times higher in those without ulcerative STDs. This group is at increased risk of contracting HIV due to the higher prevalence of non-ulcerative STDs compared to ulcerative STDs [3-5].
Ginorrhea is one of the most common sexually transmitted diseases that do not cause ulcers. Among all STDs seen in clinics, gonococcal infections account for around 10–13% of the total. Urethritis in men and cervicitis in women are the most common symptoms. Semen HIV concentrations were higher in urethritis-positive males compared to seronegative men without the condition. Semen HIV concentrations dropped dramatically during urethritis therapy. Neisseria gonorrhoeae is the bacterium that causes gonorrhoea. Only humans can serve as hosts naturally. Although purulent exudates are a hallmark of Neisseria gonorrhoeae infection, symptoms, particularly in women, may be nonexistent or very similar to those of chlamydial infection. Consequently, diagnostic tests must be conducted in a laboratory

setting [5-8].

India has seen a concerning rise in the prevalence of ciprofloxacin and penicillin-resistant N. gonorrhoeae in the past few years.9 Resistance patterns are always evolving, making it even more difficult to establish effective treatment solutions. Therefore, it is crucial to regularly assess medication resistance patterns. Increasing dosages of penicillin were the standard treatment for simple urogenital infections over the world until the emergence of penicillinase generating N. gonorrhoea in 1976. However, modern PPNG strains are resistant to even very high dosages of penicillin. A variety of drugs that have been shown to be effective against both PPNG and non-PPNG have been described, thanks to the revived interest in discovering alternative gonococcal therapy. Isolates from underdeveloped nations have demonstrated reduced sensitivity to numerous of these, perhaps due to the strong bias in favour of antibiotic resistance that has evolved among these populations [7-9].

There is no practical way to wait for susceptibility test results to be known before treating gonorrhoea. Therefore, another strategy is to be aware of the cyclical patterns of antibiotic susceptibility in gonococci. Culture is crucial for monitoring antibiotic susceptibility, which helps determine the best course of treatment based on the local strains. It is typical for gonorrhoea to coexist with other STDs such as HIV, syphilis, and trichomoniasis. The presence of a gonococcal infection increases the likelihood of contracting HIV. Preventing gonorrhoea and its sequelae, as well as the spread of HIV, requires a correct diagnosis and treatment with sensitive antibiotics. Finding out how susceptible gonococcus is to different antibiotics and how often it is seen in STD clinic patients were the primary goals of the research [8-10].

Materials and Methods

This study was prospective and observational. 40 patients who tested positive for gonococcus using gramme stained smear or Department of DVL, Nootan Medical College and Research Centre, Gujarat, India. This study was done between the February 2020 to January 2021. All patients had a standard history and clinical examination. Specimens were obtained based on the length of illness and the location of the gonococcal infection.

Specimen Collection

In Males

Before specimen collection, patients were told not to pee for at least an hour and a half. Wearing sterile gloves, specimens were gathered. When collecting urethral discharge, two sterile platinum loops were used after retractors were used to clear the area around the urethral meatus with sterile normal saline. The plating was performed directly at the bedside. In order to stain for gramme, the second loop was utilised. The specimen was obtained after milking the urethra towards the orifice to express the discharge, in the event that minimal or no discharge was detected. If there was still no discharge after milking, the next step was to insert a sterile swab treated with charcoal about 2-3 cms into the urethra and gently spin it for 5-10 seconds to scrape the mucosa. In order to rule out candidiasis and Trichomoniasis, a wet mount investigation was also performed on the discharge.

In females

To view the endocervix, a sterile Cusco's self-retaining vaginal speculum was put into the vagina without the use of lubricant. A sterile cotton swab was used to clean the cervical mucosal plug. We used two swabs to gather the specimen. To begin collecting specimens, a sterile swab coated with charcoal was placed into the endocervical canal for 2 cm and then spun for 5-10 seconds. The culture medium was injected with the specimen. Gramme staining was performed using a second sterile swab. On prepare for a wet mount, a single drop of vaginal discharge and a single drop of normal saline were mixed and then applied on a clean glass slide, covering it with a coverslip.

Results

We took samples from forty different patients. Table 1 displays the total number of patients who were diagnosed using smear and culture. Patients between the ages of 20 and 40 made up 91% of the total. There was a marriage rate of 45% for men and 100% for women. A whopping 90% of men and 66% of women could read and write. Nearly all men had jobs. Of the men surveyed, 85% identified as heterosexual, 12.5 percent as bisexual, and 2.5 percent as gay. A total of 52.5% of the men and 32.5% of the men with known contacts had their most recent sexual encounter with a CSW. Neither ceftriaxone nor azithromycin was shown to cause treatment failures.

Table 1: Gonococcus faecalis antimicrobial sensitivity

Name of the drug	Sensitive		Moderately sensitive		Resistant	
	No	%	No	%	No	%
Penicillin	0	0	26	65	15	37.5
Ciprofloxacin	0	0	14	35	20	50.0
Ceftriaxone	15	37.5	-	-	2	5.0
Cefixime	14	35.0	-	-	1	2.5
Spectinomycin	11	27.5	0	0	2	5.0
Azithromycin	40	100	40	100	40	100

Antibiotic susceptibility tests were conducted on 40 isolates of Neisseria gonorrhoeae acquired in pure culture. All isolates displayed sensitivity to azithromycin as shown in Table 1.

Table 2: Associated STDs

Type of STDs	Male	Female
Syphilis	18	1
HIV	02	0
Genital Warts	12	1
Trichomoniasis	05	1

Two male patients were diagnosed with HIV. There were 18 male patients with Syphilis and 12 with Genital Warts. A female patient had Trichomoniasis, syphilis, and genital warts (Table 2).

Discussion

Extensive research was conducted on 40 patients who had contracted a gonococcal infection. This study's analysis of age incidence found that 67.4% of patients were between the ages of 20 and 30, a sexually active demographic that is similarly highly represented in other STD studies. The 31-40 year old age bracket followed closely after. Unmarried men made up 47.5% of the sample. Similar to previous

research, this one found that people who had never been married had the highest rates of gonorrhoea infection in both sexes. Our study found that among men, 52.5% had touched a CSW, who are at high risk for contracting an STD. Female commercial sex workers were the primary vectors of infection [11-13]. Additionally, CSW was significantly involved in the transmission of gonorrhoea in our investigation. Among the men surveyed, 2.5% identified as homosexual and 12.5% as bisexual. Gonorrhoea among the gay community, which is greater than the level observed in this study. One of the most dangerous ways to contract gonorrhoea or HIV is to engage in unprotected receptive anal intercourse. Accordingly, a crucial criterion for transmission prevention is anoreceptive contact tracking [12-14].

This finding is in agreement with that of Peter Leone, who found that 50% of women with endocervical infections did not experience any symptoms at all, and that 100% of men exhibited urethral discharge, whereas 33% of females showed no symptoms at all. In contrast to men who experience symptoms sooner, asymptomatic women often wait until problems like infertility and pelvic inflammatory illnesses arise before seeking therapy [15, 16].

Our investigation found that 100% of the males and 66% of the females tested positive on the Gramme stained smear. One of the few common procedures that can reliably diagnose gonococcal infection "on the spot" is Gramme staining of vaginal secretions. Three types of outcomes are suggested for the purpose of interpreting disc diffusion test results. A less than 5% chance of treatment failure is indicated by a susceptible outcome. With the tested antibiotic administered at the recommended dosage, an intermediate result suggests a failure rate of 5% to 15%. More than 15% of clinical therapy failures are linked to a resistant outcome [17-19].

Patients may still have treatment-resistant infections, even if their bacteria show *in vitro* susceptibility, due to a number of factors. Results from tests should supplement, not replace, professional clinical judgement. Penicillin resistance was found in 70% of the isolates in this research. No bacteria or viruses in our investigation showed any signs of resistance to either penicillin or ciprofloxacin. World Health Organisation and Centres for Disease Control and Prevention do not advise the use of penicillin as a treatment. Treatment failures, an extended period of infectivity, and the subsequent dissemination of resistant strains in the population would result from continuing penicillin treatment. It was concerning that all of the isolates exhibited resistance to ciprofloxacin [20-22].

Only 7.5% of the isolates were ceftriaxone resistant, while 12.5% were cefixime resistant. I am worried about this. A 3.7% resistance rate to ceftriaxone was found in an earlier investigation conducted by this Institute in 2001. Severe ceftriaxone sensitivity was detected in 5.9% of New Delhi isolates in 2003. Inj. ceftriaxone 250 mg intramuscularly was administered to two of the three patient isolates that shown resistance to ceftriaxone. There was no treatment failure in these two individuals, and they responded well to treatment. In our investigation, 15% of the bacteria were resistant to spectinomycin, a drug that is rarely used [21-23].

The azithromycin-sensitive strains outnumbered the non-sensitive ones in our investigation. This holds promise because azithromycin is one of the medications that NACO suggests for the treatment of gonorrhoea. The fact that it protects against Chlamydial infection is an additional bonus. The results must be double-checked using disk-diffusion or, even better, the agar dilution method, which includes reference strains, as the study did not employ control bacteria. When comparing data from several laboratories conducted under diverse settings, quality control is an essential step. Azithromycin and ceftriaxone seem to provide hope, according to the study's results. Before making any therapy suggestions, further research should be conducted utilising the agar dilution method [22-24].

In this investigation, 6.9% of the total cases of gonococcal infections were related with HIV. Three instances had co-infection with syphilis. Latent syphilis affected all three of them. Genital Wart was present in one patient. Trichomonas vaginalis infection was found in one of the three female patients (33%). In order to collect data for disease intervention, antibiotic resistant strain surveillance is required. Following current standards, primary care providers should treat male patients who have been diagnosed with a gram-stained smear. It is preferable to treat patients at tertiary care levels according to sensitivity reports, at least in instances where treatment has failed [23-25].

The public and commercial sectors should collaborate on surveillance efforts. In order to make the necessary revisions to disease intervention activities and therapy recommendations, it is imperative that the data be analyzed and reviewed promptly. Laboratory facilities for surveillance should be adequately funded under STD control schemes. Programmes for monitoring should include training for lab staff and methods for quality control. With the goal of creating a monitoring network based on WHO regions, the World Health Organization launched the Gonococcal Antimicrobial monitoring Programme in 1990. Participation in GASP is contingent upon training and quality control programmes using a standardized methodology [24-26].

In order to overcome antibiotic resistance, the World Health Organisation has offered several and well-considered recommendations. Adopting the policies and strategies of the World Health Organization (WHO), educating the public and health care providers on proper medication usage, implementing measures to control the spread of drug resistance within healthcare facilities, stepping up research into new medications, and ensuring an adequate supply of life-sustaining medications are all part of the list [25-27].

In order to help health care personnel prescribe medications effectively, WHO suggests analysing surveillance data and making it available to them. The only way to stop the emergence of antibiotic resistance is to educate people and medical professionals on how to use these antibiotics wisely. It is the responsibility of governments, professional groups, and educational institutions to ensure that health care priorities are kept current by providing the data needed for efficient patient management, including the selection of appropriate medications, dosages, and optimal treatment durations. Combating medication resistance also requires community and consumer education on the prudent use of antimicrobials [26-28].

Antimicrobials are valuable, but patients must understand when and how to use them, as well as the significance of taking them as prescribed and avoiding them when not needed. The World Health Organization (WHO) recommends that healthcare facilities establish treatment guidelines by means of medicines and therapeutics

committees. In order to stop the spread of bacteria and viruses that are resistant to antibiotics, these promote infection control and drug use monitoring. As once-effective treatments become ineffective due to the ever-evolving resistance of microorganisms, it is necessary to encourage the scientific community to create new chemicals. Studying dosing schedules that are designed to reduce the chances of resistance selection is equally crucial [29-31].

Conclusion

The study's findings point to the prevalence of multidrug-resistant Neisseria gonorrhoeae in that area. All of the gonorrhoea strains tested were either less sensitive or resistant to penicillin and ciprofloxacin, casting doubt on the efficacy of these medications as a treatment. The absence of drug resistance makes azithromycin an attractive candidate. In order to stop the spread of HIV and its sequelae, it is necessary to study related STDs. The necessity of launching a nationwide initiative to track the spread of antibiotic resistance is becoming more apparent.

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None.

Conflict of Interest

None.

References

1. Gerbase AC, Rowley JT, Heymann DH, Berkley SF, Piot P. Global prevalence and incidence estimates of selected curable STDs. Sex Transm Infect. 1998;74(1):S12-S16.
2. Ray K, Bala M, Kumari S, Narain JP. Antimicrobial resistance of Neisseria gonorrhoeae in selected World Health Organization Southeast Asia Region countries-An overview. Sex Transm Dis. 2005;32(3):178-184.
3. Bala M, Ray K, Gupta SM, Muralidhar S, Jain RK. Changing trends of antimicrobial susceptibility patterns of Neisseria gonorrhoeae in India and the emergence of ceftriaxone less susceptible N. gonorrhoeae strains. J Antimicrob Chemother. 2007;60(3):582-586.
4. World Health Organization. Laboratory Diagnosis of Gonorrhoea. WHO Regional Publication, South-East Asia series. Geneva: World Health Organization; c1999. Available from: http://whoseea.org/book33/.
5. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing, Sixteenth informational supplement. 2006;26:60.
6. National AIDS Control Organization. National Guidelines on Prevention, Management and Control of RTI including STI. National AIDS Control Organization, Government of India; c2007. p. 25.
7. Handsfield H, Spalintg P. Neisseria gonorrhoeae. In: Mandell LG, Benneth EJ. Principles and practice of infectious diseases. 6th ed. Philadelphia: Elsiver Inc; 2005: 2514-2526.
8. Hansen L, Wong T, Perrin M. Gonorrhoea Resurgence in Canada. Int. J STD. 2003;14(11):727-731.
9. Ye S, Su X, Wang Q, *et al*. Surveillance of antibiotic resistance of Neisseria gonorrhoeae isolates in China. Sex Transm Dis. 2002;29(4):242-245.
10. Zheng HP, Cao WL, Wu XZ, *et al*. Antimicrobial susceptibility of Neisseria gonorrhoeae strains isolated in Guangzhou, China, 1996-2001. Sex Transm Infect. 2003;79(5):399-402.
11. Sng EH, Yeo KL, Rajan VS. Simple method for detecting penicillinase-producing Neisseria gonorrhoeae and Staphylococcus aureus. Br J Vener. Dis. 1981;57(2):141-142.
12. Agacfidan A, Kohl P. Sexually Transmitted Diseases (STDs) in the World. FEMS Immunol Med Microbiol. 1999;24(4):431-435.
13. Surveillance of antibiotic resistance in Neisseria gonorrhoeae in the WHO Western Pacific Region, 2000. Commun Dis Intell. 2001;25(4):274-276.
14. Vorobieva V, Firsova N, Ababkova T, *et al*. Antibiotic susceptibility of Neisseria gonorrhoeae in Arkhangelsk, Russia. Sex Transm Dis. 2007;83(2):133-135.
15. Stathi M, Flemetakis A, Miriagou V, *et al*. Antimicrobial susceptibility of Neisseria gonorrhoeae in Greece: data for the years 1994–2004. J Antimicrob Chemother. 2006;57:775-779.
16. Wang B, Xu JS, Wang CX, *et al*. Antimicrobial susceptibility of Neisseria gonorrhoeae isolated in Jiangsu Province, China, with a focus on fluoroquinolone resistance. J Med Microbiol. 2006;55:1251-1255.
17. Enders M, Turnwald–Maschler A, Regnath T. Antimicrobial resistance of Neisseria gonorrhoeae isolates from the Stuttgart and Heidelberg areas of southern Germany. Eur. J Clin. Microbiol Infect Dis. 2006;25:318-322.
18. Sethi S, Sharma D, Mehta SD, *et al*. Emergence of ciprofloxacin-resistant Neisseria gonorrhoeae in north India. Indian J Med Res. 2006;123:707-710.
19. Bhalla P, Vidhani S, Reddy BSN, *et al*. Rising quinolone resistance in Neisseria gonorrhoeae isolates from New Delhi. Indian J Med Res. 2002;115:113-117.
20. Bhalla P, Sethi K, Reddy BSN, *et al*. Antimicrobial susceptibility and plasmid profile of N. gonorrhoeae in India, New Delhi. Sex Transm Infect. 1998;74:210-213.
21. Ray K, Bala M, Kumar J, *et al*. Trend of antimicrobial resistance in N. gonorrhoeae at New Delhi, India. Int J STD AIDS. 2000;11:115-118.
22. Bala M, Ray K, Kumari S. Alarming increase in ciprofloxacin and penicillin-resistant Neisseria gonorrhoeae isolates in New Delhi, India. Sex Transm Dis. 2003;30:523-525.
23. Tapsall JW. Antibiotic resistance in Neisseria gonorrhoeae. Clin. Infect Dis. 2005;41(4):S263-S268.
24. Ito M, Yasuda M, Yokoi S, *et al*. Remarkable increase in central Japan in 2001–2002 of Neisseria gonorrhoeae isolates with decreased susceptibility to penicillin, tetracycline, oral cephalosporins and fluoroquinolones. Antimicrob Agents Chemother. 2004;48:3185-3187.
25. Vorobieva V, Firsova N, Ababkova T, *et al*. Antibiotic susceptibility of Neisseria gonorrhoeae in Arkhangelsk, Russia. Sex Transm Infect. 2007;83:133-135.
26. Tapsall JW. Surveillance of antibiotic resistance in Neisseria gonorrhoeae in the WHO Western Pacific Region 2002. Commun. Dis. Intell. 2003;27:488-491.
27. Tapsall JW. Antimicrobial testing and applications in the pathogenic Neisseria. In: Merlino J, ed. Antimicrobial Susceptibility Testing: Methods and Practices with an Australian Perspective. Sydney: Australian Society for Microbiology; c2004. p. 175-188.

28. Lesmana M, Lesron CI, Taslim D, *et al*. *In vitro* antibiotic susceptibility of Neisseria gonorrhoeae in Jakarta, Indonesia. Antimicrob Agents Chemother. 2001;45:359-362.
29. Sharma VK. Sexually Transmitted Diseases and AIDS. New Delhi: Viva Books Private Limited, 2003;489-491.
30. Tapsall JW. Annual report of the Australian Gonococcal Surveillance Programme, 2005. Commun Dis. Intell. 2006;30:205-210.
31. Akasaka S, Muratani T, Inatomi H, *et al*. Emergence of cephem- and aztreonam-high-resistant Neisseria gonorrhoeae that does not produce β-lactamase. J Infect Chemother. 2001;7:49-50.