

EVALUATION OF CIPROFLOXACIN AND CEFTRIAZONE'S EFFICACY IN THE TREATMENT OF GONORRHOEA

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ABSTRACT

INTRODUCTION: A very infectious bacterial illness that may infect both men and women via sexual contact is gonorrhoea, a serious public health hazard. It is among the most ancient sexually transmitted infections (STIs), and *Neisseria* is the cause. Rarely, gonorrhoea may also result in pharyngeal, ocular, articular, and dermatological conditions in addition to its predominant urogenital signs and symptoms. Gonorrhoea has been treated with various antibiotics, including spectinomycin, cephalosporins, tetracyclines, macrolides, sulpha medicines, and fluoroquinolones. Some of these medications are no longer used to treat gonorrhoea due to an increase in resistant infections.

OBJECTIVE: This research compared the efficaciousness of Ceftriaxone and ciprofloxacin in managing gonococcal infections.

STUDY DESIGN: A- Observational- Study

Place And Duration of Study: The study was conducted in New Gulail Polyclinic, Saudi Arabia, from January 2003 to March 2004.

METHODS: With the institutional Ethical Committee's consent, 200 patients received Ceftriaxone and ciprofloxacin to treat gonorrhoea. Enrolling the patients included the use of a purposeful sampling approach. Every patient was divided into two groups of 100 individuals, each at random. Group B received a single intravenous dose of 500 mg of Ceftriaxone Injection, whereas Group A received a 500 mg tablet of Ciprofloxacin. After five days, all of the patients had follow-up examinations, and their lab and clinical test results were documented and evaluated.

RESULTS: Patients in Group A (n=100) receiving ciprofloxacin demonstrated 80% full response, 9% partial response, and 11% showed no improvement on the fifth day after therapy. On the other hand, patients taking ceftriaxone in Group B (n=100) had 90% complete responses, 4% partial responses, and 6% no responses at all.

To sum up, Ceftriaxone treated gonorrhoea more well than ciprofloxacin. It is recommended that all patients get a follow-up examination to confirm the whole course of therapy for gonorrhoea after taking a single antibiotic dosage.

KEYWORDS: *Neisseria gonorrhoea, sexually transmitted infection (STI), Sexually Transmitted Disease (STD)*

INTRODUCTION

Gonorrhoea is mucopurulent inflammation of the urogenital tract and is a highly contagious

illness among STIs brought on by the gram-negative diplococcus *Neisseria gonorrhoea*¹. A gonococcal infection may infect both men and women via a variety of unprotected sexual contact behaviors, such as oral, anal, or vaginal sex. During birthing, an infected mom may potentially vertically transmit ophthalmia neonatorum to her fetus. This infection often coexists with chemosis and lid edema within 48 hours after birth^{2,27}. Unprotected sexual contact between men and women raises the chance of infection transmission by 80%, whereas contact between women and men increases

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the risk by 20%³. A variety of obvious adverse effects, including encephalitis, pelvic inflammatory disease (PID), cervicitis leading to ectopic pregnancy, perihepatitis (Fitz Hugh Curtis syndrome), infertility, and epididymitis, are experienced by both men and women as a result of poorly managed or untreated cases.^{4,27} It is known that men with a history of gonorrhea or syphilis are more likely to acquire prostatic cancer. Many studies have been conducted on the connection between gonorrhea and prostate cancer, but as of yet, no conclusive evidence has been found⁵. Research and reports on the therapeutic efficacy of various drugs used to treat gonorrhea have been carried out globally. These studies have shown that *N. gonorrhoea* is losing some of its resistance to antibiotics worldwide⁶⁻⁹. The rise of gonorrhea strains resistant to antibiotics is an increasing problem that has made selecting medications a challenging undertaking. Various antibiotics, including sulpha medications, penicillins, tetracyclines, azithromycin, ciprofloxacin, Ceftriaxone, spectinomycin, and Cefixime, are used to treat gonorrhea. Since Ceftriaxone and ciprofloxacin are used more often in our setup, we chose to compare the efficacy of these two antibiotics in our research.

Since its introduction in 1987, ciprofloxacin has been a part of the second generation of fluoroquinolones, which exhibit greater efficacy against atypical and gram-negative microorganisms. Its effectiveness against gram-positive organisms is restricted. Soft tissue, gastrointestinal, genitourinary, and respiratory infections are among the many conditions for which it may be utilized. By interfering with DNA replication, it prevents bacteria from proliferating. It is not recommended for use in children under the age of eighteen because of the increased risk of tendon rupture, myasthenia gravis, and articular cartilage injury, in addition to the usual adverse effects²⁴. Compared to certain antibiotics, such as cephalosporins, the risk of adverse effects is higher^{23,24}. Ceftriaxone is a third-generation broad-spectrum cephalosporin introduced in the United States in 1984 and approved for infections like Respiratory, gastrointestinal tract infections, meningococcal, gonococcal, and soft tissues. There have been reports of glossitis, pancytopenia, blood clots, and hypersensitivity. Both pseudo cholelithiasis and sore throat²⁵.

METHODS

The New Gulail Polyclinic in Jeddah, Saudi Ara-

bia, carried out this investigation with approval from the institutional ethics council. Before the medication above was administered, informed permission was obtained from each participant or subject in the research.

In this research, 200 patients who were diagnosed with gonorrhea and visited the medical department of the New Gulail Polyclinic between January 2003 and March 2004 were included. Their medical history, clinical results, and laboratory results were documented on a particular proforma. There were 152 men and 48 women among the subjects, ages 14 to 55. The clinical diagnosis of hazy urethral discharge and dysuria after a recent sexual encounter was rather simple in male patients. Their urethral discharge was stained with gram stain to confirm the diagnosis, and their urine was examined. High vaginal swabs were taken from each female patient for confirmation by gram staining and culture. The primary diagnostic criterion for vaginal discharge was the intracellular presence of gram-negative diplococci since females often exhibit no symptoms.¹⁰ Without considering gender, the patients were randomly split into two groups of 100. Patients in Group A received an oral pill containing 500 mg of Ciprofloxacin, whereas patients in Group B received an injection of 500 mg of Ceftriaxone intravenously (IV). While it was previously believed that I/M injections had a depot effect in cases of gonococcal infection, Workowski (2010) found that, after 24 hours, the plasma concentrations of Ceftriaxone I/M and I/V were identical. Five days after starting therapy, all patients underwent clinical examinations, laboratory tests were performed, and data was collected for analysis. Urine microscopy, gram staining, prostatic fluid microscopy in men, and vaginal secretion microscopy in women were performed during the follow-up and documented on a proforma.

RESULTS

All 200 individuals in this research, 48 girls (23.66%) and 152 men (76.33%), aged 14 to 55, had been clinically diagnosed with gonorrhoea. Table 1 displays the age and sex distribution of the patients; the majority of the patients were in the 20–40 age range.

Both male and female patients' clinical presentations are shown in Table II. The main symptoms of every male patient were dysuria and a characteristic thick yellow urethral discharge. The most common symptom in females was purulent and yellow vaginal discharge; 28 cases reported dysuria and lower ab-

dominal discomfort. Vaginal exams revealed that the endocervix caused the illness. Gram staining of vaginal discharge for gram-negative diplococci in pus cells was always done in addition to urine tests to confirm the diagnosis. Table III shows gonorrhea antibiotic efficacy. Dysuria and urethral discharge in men and vaginal discharge in women, as well as gram staining and microscopy of prostatic fluid in men and vaginal secretion in women, were used to identify a partial reaction from no response. Group-A patients (n = 100) got 500 mg of ciprofloxacin orally on day one.

Eighty patients (80%) recovered by the fifth follow-up day. Just nine (9%) patients complained of dysuria. Gram staining of male prostatic fluid and female vaginal secretions revealed diplococci in pus cells (++) and urine. The remaining 11 patients (11%) did not respond, demonstrating no improvement in laboratory tests or symptoms. Thus, we considered them partially responding. Ciprofloxacin failed 20% of patients because of this. Group-B patients (n = 100) were 90% cured at follow-up on the fifth day after receiving 500 mg of ceftriaxone single dose I/M on the first day. Four (4%) reported slight dysuria on day five. In men's prostatic secretions and women's vaginal secretions, microscopic urine examinations showed pus cells (++) and gram-negative diplococci (+). Medicine may have contributed to these cases. The other 6 cases (6%) had the same symptoms and test findings and did not respond to this drug. In this cohort, 10% of ceftriaxone patients were clinically unsuccessful.

DISCUSSION

The sexually transmitted disease gonorrhea is very infectious and is often known as "the clap" and "the drip" because of its particular clinical symptoms and mode of transmission¹. Effective public awareness programs in affluent nations have reduced gonorrhea. According to the WHO, gonorrhea infections dropped from 106 million in 2008 to 78 million in 2016.

The majority of gonorrhea patients in this study are between the ages of 20 and 40, and the proportion of male patients who exhibit symptoms of urethral discharge and dysuria is significantly higher than that of female patients. This difference in symptoms between male and female patients is consistent with research conducted in other nations^{3,12-14}.

Gonorrhea may be treated and cured if caught early. Unfortunately, the majority of women who have gonorrhea do not exhibit symptoms that would

Table 1: Age and sex distribution

Age	Male	Female	Total
0-6 months	20	17	37 (58.73%)
7-12 months	11	06	17 (26.9%)
Above 12 months	06	03	9 (14.28%)

Table 2: Clinical presentation of the patients

Symptoms	Numbers	Male	Female
urethral discharge	153	153	-
vaginal discharge	48	-	48
dysuria	180	152	28

Table 3: Clinical efficacy of antimicrobials in the treatment of gonorrhea

Groups	Drugs	Single dose	Fully sensitive	Partially sensitive	Non-sensitive
A(n=100)	ciprofloxacin	500mg (oral)	80	09	11
B(n=100)	ceftriaxone	500mg (I/m)	90	04	06

prompt them to see a doctor³. Various additional factors contributing to the rise in gonorrhea cases in various regions of the globe include the lack of follow-up visits after an antibiotic dosage, inappropriate drug selection, and the emergence of resistant gonococci infections. Thirteen N. gonorrhea exhibits antimicrobial resistance via two different mechanisms: chromosomally mediated resistance to spectinomycin, Tetracycline, Penicillin, and most recently, fluoroquinolones, and plasmid-mediated resistance to these drugs,^{11,15,17} and^{18,17,19} Fluoroquinolone resistance is widespread across the globe^{18,22}, and in many nations it is no longer regarded as the suitable first therapy for gonorrhea²⁴.

In 20% of the instances, our investigation revealed nonresponsiveness. In 20% of instances, there is either moderate (9%) or total (11%) ciprofloxacin resistance. In 1987, Handsfield reported that 125 mg of Ceftriaxone given to 155 individuals resulted in the eradication of Neisseria gonorrhea in 99% of instances. 90% of the gonococci are eradicated in our research when Ceftriaxone is used, comparable to the Handsfield study. Resistance to ceftriaxone has been reported in many studies^{17,22}, and our study shows resistance in 10% of the cases. If Ceftriaxone is used in high doses and combined with other antibiotics, it will be more effective than ciprofloxacin.

CONCLUSION

Despite showing minimal resistance, ceftriaxone, with fewer side effects, is more effective and superior to ciprofloxacin in the treatment of gonorrhoea.

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REFERENCES

1. Britigan BE, Cohen MS, Sparling PF. Gonococcal infection; a model of molecular pathogenesis. *N Engl J Med* 1985;312:683–94.
2. Woods CR. Gonococcal infections in neonates and young children. *Semin Pediatr Infect Dis* 2005;16:258–70.
3. Barlow D, Phillips I. Gonorrhoea in women—diagnostic, clinical and therapeutic aspects. *Lancet*, 1978; I(8067):761–4.
4. Johnson RA. Diagnosis and treatment of common sexually transmitted diseases in women. *Clin Cornerstone* 2000;3(1):1–11.
5. Hayes RB, Pottner LM, Strickler H, Rabkin C, Pope V, Swanson
6. GM et al. Sexual behavior, STDS & risks of prostatic cancer. *Br J Cancer* 2000;82:718–25.
7. Knapp JS, Wongba C, Limpakarnjanarat K, Young NL, Parekh MC, Neal SW, et al. Antimicrobial susceptibilities of strains of *N. Gonorrhoea* in Bangkok, Thailand 1994–1995. *Sex Transm Dis* 1997;24(3):142–8.
8. Johnson SR, Morse SA. Antibiotic resistance in *N. gonorrhoeae*: Genetics and mechanisms of resistance. *Sex Transm Dis* 1988;15(4):217–24.
9. Zheng HP, Cao WL, Wu XZ, Yang LG. Antimicrobialsusceptibilities of strains of *N. Gonorrhoeae* strains isolated in Guangzhou, China. 1996–2001. *Sex Transm Infect* 2003;79(5):399–402.
10. Rahman M, Sultan Z, Monira S, Alam A, Nessa K, Islam S, Antimicrobial susceptibility of *N. Gonorrhoeae* isolated in Bangladesh (1997 to 1999), rapid shift to fluoroquinolone resistance. *J Clin Microbiol* 2002;40(6):2037–40.
11. Jephcott AE. Microbiological diagnosis of gonorrhoea. *Genitourin Med* 1997;73:245–52.
12. Su X, Hutapea N, Tapsall JW, Lind I. Plasmid-mediated resistance of *Neisseria gonorrhoeae* strains isolated from female sex workers in North Sumatra, Indonesia, 1996. *Sex Transm Dis* 2003;30(2):178–82.
13. National Institute of Allergy and Infectious Diseases; National Institutes of Health, Department of Health and Human Services (2001-07-20). ‘Workshop Summary; Scientific Evidence on Condom Effectiveness for Sexually Transmitted Disease (STD) Prevention’ Hyatt Dulles Airport, Herndon, Virginia. Pp Annual report of the Australian Gonococcal Surveillance Program. 1998, *Commun Dis Intell* 1999;23(7):193-7.
14. Herida M, Srdnaoni P, Goulet V. Gonorrhoea Surveillance System in France: 1986–2000. *Sex Transm Dis* 2004;31(4):209–14.
15. Bhuiya BU, Rahman M, Miah MRA. Nahar S, Islam N, Ahmed M, et al. Antimicrobial Susceptibilities and Plasmid Contents of *Neisseria gonorrhoeae* Isolates from Commercial Sex Workers in Dhaka, Bangladesh: Emergence of High-Level Resistance to Ciprofloxacin. *J Clin Microbiol* 1999;37(4):1130–6.
16. Centers for Disease Control & Prevention. ‘Gonorrhoea among men who have sex with men: 1993–96. *JAMA* 1997;278: 1228–9.
17. Ison CA, Martin IM. Gonorrhoea in London: Usefulness of First Line Therapies. *Sex Transm Inf* 2002;78:106–9.
18. Heffernan H, Brokenshire M, Woodhouse R, MacCarthy A, Blackmore T. Antimicrobial susceptibility among *N. gonorrhoeae* in New Zealand in 2002. *NZ Med J* 2004;117(1191):U817.
19. Ng LK, Martin I, Lau A. Trends of chromosomally mediated antimicrobial resistance in *N. gonorrhoeae* in Canada. *Sex Transm Dis* 2003;30(12):896–900.
20. Ye S, Su X, Wang Q, Yin Y, Dai X, Sun H. Surveillance of Antibiotic resistance of *N. gonorrhoeae* isolates in China, 1993–98. *Sex Transm Dis* 2002; 29:242–5.
21. Echolas PM, Hyed A, Okeefe BJ, Schacht P. Single dose Ciprofloxacin for the treatment of uncomplicated gonorrhoea. *Sex Transm Dis* 1994;21(6):345–52.
22. Nissinen A, Jarvinen H, Jahnkola M, Limatainen O. Antimicrobial resistance in *N. gonorrhoeae* in Finland, 1976–5. *Sex Transm Dis* 1997; 24:576–81.
23. Ball P. Quinolones generations; Natural History or Natural selection. *Journal of Chemotherapy* 46 (2000):17-24.
24. Stalmann R, Forster C, Van Sickle D. Quinolones are concern over arthropathy justified? *Drug Safe* 1993, Vol.9:397-403
25. Pletz MW, Rau M, Bulitta J, Ertapenem pharmacokinetics and impact on intestinal microflora, compared to Ceftriaxone after multiple dosing in male and female volunteers. *Antimicrobe agents chemother* 48(2004):3765-72
26. Workowski KA, Berman S; Centers for Disease Control and Prevention (CDC). Sexually transmitted diseases treatment guidelines, 2010. *MMWR Recomm Rep* 2010;59(RR-12):1-110.
27. Miller KE Diagnosis and Treatment of *N. gonorrhoea* infections. *Am Fam Physician* 2006 May 1573 (10):1779-84