WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 10, Issue 7, 12-15. Research Article ISSN 2277– 7105

GONORRHOEA TREATMENT: EVALUATION OF COMMERCIAL CEFIXIME POTENCY USED IN ONE OF INDONESIAN PUBLIC HEALTH CENTER

Sri Agung Fitri Kusuma[1]* and Danni Ramdhani[2]

[1]Department of Biology Pharmacy, Faculty of Pharmacy, Padjadjaran University, Sumedang, West Java, Indonesia 45363.

[2]Department of Pharmaceutical Analysis and Medicinal Chemistry, Faculty of Pharmacy,

Article Received on
25 April 2021,

Revised on 15 May 2021,
Accepted on 04 June 2021

DOI: 10.20959/wjpr20217-20740

***Corresponding Author**
Sri Agung Fitri Kusuma
Department of Biology Pharmacy, Faculty of Pharmacy, Padjadjaran University, Sumedang, West Java, Indonesia 45363.

ABSTRACT

Objective: this study was purposed to evaluate the cefixime commercial antibiotic potency as one of antibiotics used to treat gonorrhoea in Indonesian public health centers. **Methods:** Microbiological assay is one of methods used to quantify the potency of antibiotics using the Kirby Bauer agar diffusion method. **Results:** The results showed that commercial cefixime potency was 95.8 %. **Conclusion:** The commercial cefixime antibiotics consumed by patients at this public health center still has good antibacterial potential to be used.

KEYWORDS: Cefixime, commercial, potency, public health center, Indonesia.

INTRODUCTION

The threat of antibiotic-resistant gonorrhoea is of grave concern. The causative agent of gonorrhoea is the bacterium *Neisseria gonorrhoeae*, an obligate human pathogen.[1] Gonorrhoea is one of the most common bacterial sexually transmitted infections. As the bacterium has developed resistance to each first-line antibiotic in turn, we need an improved understanding of fitness benefits and costs of antibiotic resistance to inform control policy and planning. Cefixime was recommended as a single-dose treatment for gonorrhoea, during which time resistance increased, and subsequently declined. The greatest cause for concern, however, is the rapid growth in antimicrobial resistance. The bacterium has quickly

developed resistance to each first-line antibiotic in turn, from penicillin to cephalosporins, such as cefixime and ceftriaxone.[2,3]

The effectiveness of treatment with antibiotics is necessary to review to determine the cause of the failure of therapy. Antimicrobial chemotherapy plays a critical role in fighting against infectious disease caused by microorganisms, but antibiotic resistant microorganisms are an increasing problem of public health. The misuse of antibiotics fosters the increase and spread of antibiotic resistance, and may lead to super-infections.[4,5] Due to increasing resistant problems, the quantification of the actual concentration of active ingredient in antibiotic preparation is critical. The effectiveness of antibiotic agents depends on many factors such as route of administration, location of infection, presence of interfering substances, concentration of the drug in the body, the nature of the pathogen, the presence of drug allergies and resistance of microorganism to the drug.[5,6] The effectiveness of antibiotics is described in terms of potency and accurate measurement of potency is critical in pharmacology to safe and proper use of antibiotics.[7] Microbiological assays are prescribed for the drug substances and preparations where the potency cannot be adequately determined by chemical means. Additionally, the resistance and sensitivity of pathogenic microorganisms is also determined by microbiological assays. These are performed daily on bacterial isolates in clinical and quality control laboratories. All microbiological assay techniques involve either diffusion of antimicrobial agent in the agar or dilution of antibiotic in agar or broth.[8]

MATERIALS AND METHODS

Materials

The culture media that were used are Mueller-Hinton Agar (MHA-Oxoid) and Mueller-Hinton Broth (MHB-Oxoid). The chemicals used are distilled water, normal saline solution, barium chloride solution (Merck), sulfuric acid solution (Merck), cefixime standard, cefixime commercial, and buffer solution No. 1.

Test Organism

The bacterium that was used in this study is *Staphylococcus aureus* ATCC 25923. Preparation of *S. aureus* was conducted by taking one Ose of *S. aureus* colony from slant agar, then suspended into sterile physiological saline. Bacterial turbidity was measured using a spectrophotometer and compared with a standard 0.5 Mc Farland.[9]

Antibacterial Potency Test

The determination of cefixime antibiotic potency was performed using Bauer agar diffusion method. The cefixime antibiotic solution was prepared by removing the cefixime from its capsules then weighing it to the equivalent of 100 mg of the active substance and dissolved with a buffer solution of D1. D1 buffer solution D1 was made of 2.0 g of potassium phosphate dibasic and 8.0 g of potassium phosphate monobasic dissolved in 1 L of distilled water. Then pH was adjusted to 6.0 ± 0.05 with phosphoric acid 18 N or 10 N potassium hydroxide solution after sterilized at the autoclave (121 ° C for 15 min). Then cefixime was diluted using sterile distilled water to achieve the concentration of 15 mg / mL, 10 mg / mL, and 5 mg / mL. A total of 20µL bacterial suspension equivalent to 0.5 Mc Farland was dropped into a streile petri dish, then a volume of 20 mL MHA was poured into the petri dish. The medium was homogenized and allowed to solidify. The media were perforated to make holes for storing the tetracycline in each concentration 0f 50 µL. All the medium test were incubated at 37 ° C for 18-24 h. Potency value was calculated using 3+3 design calculation.

RESULTS AND DISCUSSION

The result of the potency cefixime determination showed that *S. aureus* was sensitive against cefixime. The standard cefixime was more active than the commercial against *S. aureus* type sensitive strains, but the difference in diameters of inhibition was not significant. The potency value of commercial cefixime was 95.86%, below the requirement of Indonesian Pharmacopoeia, not less than 97.5%. The result was presented in Table 1. It seems that the lower potency value was not the result of degradation of the active substance but due to the quality of the active substance used. This data can be used as a reference for the public health center in selecting suppliers of antibiotics, especially cefixime antibiotics.

Table 1: Diameter of Zone Inhibition.

Antibiotic concentration (mg/mL)	Diameter of Inhibition (mm)	
	Standard	Commercial
5	22.52±0.025	22.33±0.010
10	20.14±0.005	19.68±0.000
15	15.10±0.005	15.12±0.000

Note: Perforator diameter = 9 mm

The absence of microbial growth around the wells indicates the ability of that antimicrobial compound to inhibit the growth of microorganism. The inhibition of microbial growth in standardized conditions may be utilized in demonstrating the therapeutic efficacy of

antibiotics. However, determination of antimicrobial potency is extremely important for the quality control and quality assurance of antibiotic preparations.

CONCLUSION

Our results demonstrated that the potency of cefixime commercial that were used at one of health centers in Indonesia was 95.86%.

REFERENCES

1. Spongberg M. Feminizing Venereal Disease. London, UK: Palgrave Macmillan, 1997.
2. Lewis DA. (The Gonococcus Fights Back: Is This Time A Knock Out?). Sex Transm Infect, 2010; 86(6): 415-421.
3. Grad YH, Kirkcaldy RD, Trees D, Dordel J, Harris SR, Goldstein E, *et al*. (Genomic Epidemiology Of Neisseria Gonorrhoeae With Reduced Susceptibility To Cefixime In The USA: A Retrospective Observational Study). Lancet Infect Dis., 2014; 14(3): 220-226.
4. Nishant AD, Semwal UP, Agarwal PK. (Development And Validation Of Microbial Bioassay For Quantification Of Levofloxacin In Pharmaceutical Preparations). J Pharm Anal, 2015; 5(1): 18–26.
5. Prescott LM, Harley JP, Klein. DA. Microbiology 7th ed. New York: Mcgraw-Hill, 2008.
6. Knobler SL, Lemon SM, Najafi M. The Resistance Phenomenon in Microbes and Infectious Disease Vectors: Implications for Human Health and Strategies for Containment: Workshop Summary. Washington (DC): National Academies Press (US), 2003.
7. Branson E. Clinical relevance of minimum inhibitory concentration. Aquaculture, 2001; 11: 289–296.
8. Nishant AD, Uttam PS, Rupak KR, Singh GN. Selection of appropriate analytical tools to determine the potency and bioactivity of antibiotics and antibiotic resistance. J Pharm Anal, 2016; 6(4): 207–213.
9. Wiegand I, Kai H, Robert EW, Hancock. (Agar And Broth Dilution Methods To Determine The Minimal Inhibitory Concentration (MIC) Of Antimicrobial Substances). Nat Protocol, 2008; 3(2): 163-175.