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POTENTIAL AND COMPARATIVE TESTS OF CEFADROXILE ANTIBIOTICS AS EVALUATION OF THE QUALITY OF ANTIBIOTICS IN CASES OF ANTIBIOTIC RESISTANCE

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ABSTRACT

Objective: Acute Respiratory Infection (ARI) is an acute infection of any part of the respiratory tract including the paranasal sinuses, middle ear, and pleural cavity. Cefadroxile antibiotics are one of the antibiotics commonly used to treat ARI. The use of antibiotics that are of less quality and can cause treatment is less effective and can cause resistance. This study aims to determine the potential value and comparative test of cefadroxile antibiotics as a quality evaluation. **Methods:** Test the antibiotic potency with diffusion method to use 3 doses with using antibiotic samples. Comparative test of antibiotic testing by comparing samples with standard against *Staphylococcus aureus* ATCC 29213 test bacteria. **Results:** The potential value obtained was 72.92%, and comparative test againts pure strains was 1 : 0.92, and comparative test againts clinical isolates was 1 : 0.99. **Conclusion:** Potential antibiotic test results indicate that the potential value of the cefadroxile antibiotic used has decreased from the provisions listed in Indonesian pharmacopoeia 95 – 105%, and comparative test were not much different with the standard.

KEYWORDS: Cefadroxile, antibiotic resistence, potential test, comparative test, agar diffusion.

INTRODUCTION

Acute Respiratory Infection (ARI) is a major cause of infectious morbidity and mortality in the world. Resistance factors for bacterial causes of ARI against antibiotics are one of the causes of high rates of infection.[1]

ARI can be caused by bacteria, viruses and rickets such as Streptococcus genus, Staphylococcus, Pneumococcus, Hemophilus, Bordetella, and Corynebacterium.[2] Virus causes include 9 groups Mexovirus, Adenovirus, Coronavirus, Pikornavirus, Mikoplasma, Herpesvirus, and others.[3]

Testing the potential of antibiotics aims to determine the biological activity of an antibiotic in inhibiting microorganisms, which cannot be determined chemically or physically.[3] Testing the comparative value of antibiotic activity aims to determine the comparison of antibiotic activity with standard samples against clinically sensitive bacterial isolates.[4]

In this study will be tested potential test of cefadroxile which is also an important data to determine the quality of antibiotics used in the health center of Tasikmalaya City. The requirements of antibiotic levels should be in accordance with Indonesia Pharmacopeia.

MATERIALS AND METHODS

Test Materials

Materials tested were cefadroxile standard from PT. Sanbe Farma, Indonesia. McFarland standard No. 0.5, and physiological saline 0.9% (Merck).

Bacteria Test

Test bacteria used to test the potential of cefadroxile antibiotics is Staphylococcus aureus ATCC 29213.[5]

Bacterial Growth Media

Bacteria growth medium used was Mueller Hinton Agar (Merck) with a concentration of 43 g/L and Mueller Hinton Broth (Oxid, Basingstoke, UK) at a concentration of 21 g/L, Mueller Hinton Agar (Merck, USA) with a concentration of 43 g/L.[5]

Method

The antibiotic potency test was performed by agar diffusion method. Determination of antibiotic potency using 3 doses done calculation by formula:

$I = \log \frac{Dt}{Dm} = \log \frac{Dm}{Dr}$

$E = \frac{1}{4} x [(St - Sr)] + [(Bt - Br)]$

$b = \frac{E}{\log 2}$

$F = \frac{1}{3} x [(St + Sm + Sr)] - [(9Bt + Bm + Br)]$

$M = \frac{F}{b}$

Potency = antilog M x 100%.[6]

Testing the comparability of cefadroxile antibiotics using sample and standard antibiotics with 4 variations of concentration, namely 200 µg / mL, 100 µg / mL, 50 µg / mL, and 25 µg / mL.[7]

RESULT AND DISCUSSION

Testing Potential Antibiotics

The potential test of cefadroxile antibiotics according to IV Pharmacopoeia Indonesia (1995) was used Staphylococcus aureus ATCC 29737 bacteria. The experimental pattern of the agar diffusion method used is the 3 + 3 pattern where one comparison standard is used and one sample with 3 dose variations. The doses used were high doses (200 µg / mL), medium doses (100 µg / mL), and low doses (50 µg / mL).[8]

The inhibition diameter obtained from the test for the potential of cefadroxile antibiotics can be seen in Table 1.

Table 1: Inhibition Diameter of Potential Test Results.

Inhibition Diameter (mm)					
$S_{td}H$	$S_{td}M$	$S_{td}L$	$S_{sm}H$	$S_{sm}M$	$S_{sm}L$
31.20	29.65	28.5	30.00	29.81	27.90

Table Descriptions

$S_{td}H$: High Dose Standard
$S_{td}M$: Middle Dose Standard
$S_{td}L$: Low Dose Standard
$S_{sm}H$: High Dose Samples
$S_{sm}M$: Middle Dose Medium
$S_{sm}L$: Low Dose Samples

The results of the calculation of the potential test for cefadroxile antibiotics with a three-dose pattern obtained a value of 72.92%. The potential value of this antibiotic has decreased compared to the requirements in the Indonesian Pharmacopoeia, which is between 95%-105%.[6]

Antibiotic Comparison Test

The comparative test of antibiotic activity aims to be resistant to antibiotics using resistant clinical isolate bacteria. The result of this treatment is for patients with respiratory

infection.[8] Testing the comparability of cefadroxile antibiotics using sample and standard antibiotics with 4 variations of concentration, namely 200 µg / mL, 100 µg / mL, 50 µg / mL, and 25 µg / mL. The comparative test values of antibiotic samples and standards cefadroxile can be seen in figure 1.

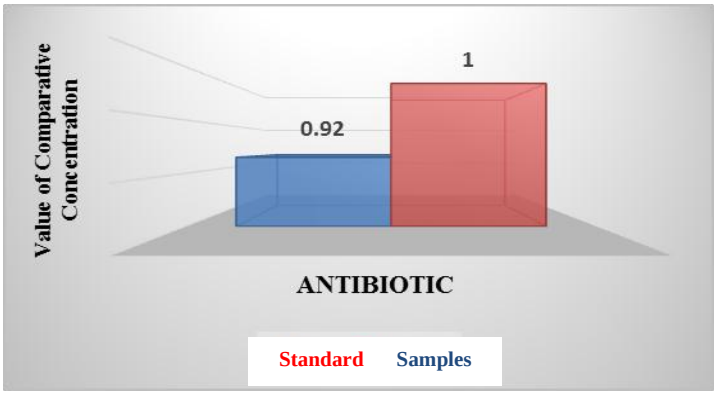

Figure 1: Comparative test values of antibiotic samples and standards against pure strains.

The comparative value of cefadroxile antibiotics obtained is 1: 0.92, this value indicates that the concentration needed by the antibiotic sample is not much different from the standard antibiotic comparison aginst pure strain.[9]

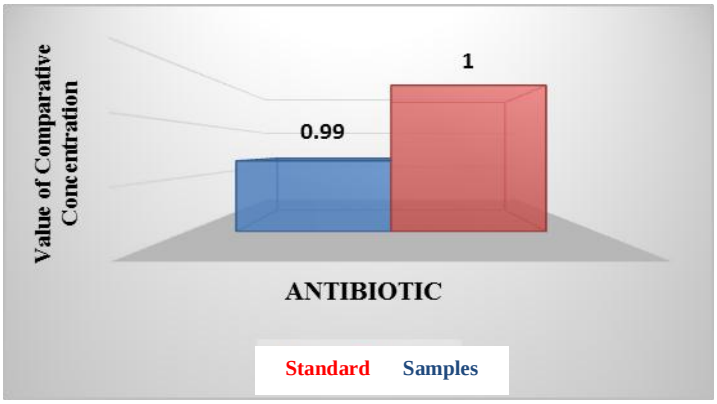

Figure 2: Comparative test values of antibiotic samples and standards against clinical isolates of Streptococcus bacteria.

The comparative value of cefadroxile antibiotics obtained is 1: 0.99, this value indicates that the concentration needed by the antibiotic sample is not much different from the standard antibiotic comparison against clinical isolates of Streptococcus bacteria.[9]

CONCLUTION

The antibiotic potency of cefadroxile was 72.92%. The potential test value of this antibiotic has decreased compared to the requirements in the Indonesian Pharmacopoeia. The comparative test of cefadroxile against pure strain and clinical isolates of Streptococcus were not much different with the standard.

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