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EVALUATION OF ANTIBIOTIC RESISTANCE CASES IN ARIS DISEASE: POTENTIAL TEST AND COMPARATIVE TEST OF LEVOLOXACIN ANTIBIOTICS USED IN TASIKMALAYA CITY HEALTH CENTER

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ABSTRACT

Objective: Acute respiratory infection (ARIs) is an acute respiratory infection that attacks the throat, nose and lungs caused by viruses, bacteria, rickettes. Antibiotics is one way to overcome the disease ARIs. Ineffective use of antibiotics may lead to resistance. The potential value of antibiotics determines the effectiveness of an antibiotic. This study aims to determine the potential value and comparative test of levofloxacin antibiotics as a quality evaluation. **Methods:** Test the antibiotic potency with diffusion method to use 3 doses. 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 102.3%, and comparative test was 1: 2.69. **Conclusion:** The results of testing the potential of this antibiotic in accordance with the requirements contained in the USP is 90 -110%. The comparative test results show that antibiotic samples used had good bacterial killing ability.

KEYWORDS: Levofloxacin, Potential Test, Agar Diffusion, Comparative Test.

INTRODUCTION

In Indonesia, Acute Respiratory Infection (ARIs) disease is still the main cause of morbidity and mortality, especially in infants at 28%. Prevention and control of ARI is a top priority of

development in the Tasikmalaya region in the health sector (Profile of West Java Provincial Health Office, 2003).

ARIs can be caused by bacteria, viruses and rickets such as Streptococcus genus, Staphylococcus, Pneumococcus, Hemophilus, Bordetella, and Corynebacterium. Virus causes include 9 groups Mexovirus, Adenovirus, Coronavirus, Pikornavirus, Mikoplasma, Herpesvirus, and others (Depkes RI, 2000).

Previous research has obtained the data of clinical isolates isolate from oral cavity of ISPA to some antibiotics used to treat ISPA at puskesmas of Tasikmalaya City. The resistance data is 70.25% resistant to sefadroksil; 68.03% are resistant to amoxicillin, and 43.03% are resistant to ciprofloxacin (Ramdhani et al, 2017).

In this study will be tested potential test of levofloxacin 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 United States Pharmacopeia.

MATERIALS AND METHODS

Test Materials

Materials tested were levofloxacin from PT. Sanbe Farma used in community health center in Tasikmalaya, West Java, Indonesia. McFarland standard No. 0.5 (Merck, USA), and physiological saline 0.9%.

Bacteria Test

Test bacteria used to test the potential of levofloxacin antibiotics is Staphylococcus aureus ATCC 29213.

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.

Method

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

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

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

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

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

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

Potensi = antilog M x 100% (Depkes RI, 1995).

RESULT AND DISCUSSION

Testing Potential Antibiotics

The potential test of levofloxacin antibiotics according to Pharmacopoeia Indonesia IV (1995) was used Staphylococcus aureus ATCC 29737 bacteria. The potential test used is 3 + 3 pattern in which one reference standard was used and one sample with 3 dose variations. The dose used was 20 µg / mL as a high dose, 10 µg / mL as the middle dose and 5 µg / mL as a low dose. Potential testing was done three repetitions. The average diameter obtained is as follows:

Table 1: Inhibition Diameter of Potential Test Results.

Inhibition Diameter (mm)			
SdH	**1.24**	**ST**	**1.23**
BM	1.20	SM	1.12
BR	0.95	SR	1.05

SdT: High Dose Standard 20 µg / mL

SdM: Middle Dose Standard 10 µg / mL

SdL: Low Dose Standard 5 µg / mL SR

SpT: High Dose Samples 20 µg / mL

SpM: Middle Dose Medium 10 µg / mL

SpL: Low Dose Samples 5 µg / mL

The results of antibiotic potency testing of levofloxacin with a three-dose pattern obtained for 102.03%. These results indicate that levofloxacin antibiotics used in Tasikmalaya city health centers still meet the requirements listed in the USP at 90-110% (USP, 2014).

Antibiotic Comparison Test

The comparative test of antibiotic activity aims to compare the antibiotic activity of the sample against the standard using resistant clinical isolate bacteria. The result of this appeal value is expected to be a guide in the proper treatment for patients with respiratory infection (Hermita, 2004). Testing of levofloxacin antibiotic appeal values using sample and standard antibiotics with 4 concentration variations, ie 80 µg / mL, 60 µg / mL, 40 µg / mL, and 20 µg / mL. The inhibitory diameter obtained from the appellate value of levofloxacin antibiotic activity can be seen in Table 2.

Table 2: Inhibitory Diameter of Comparative Antibiotic Test.

Concentration / Antibiotics	80 µg/mL	60 µg/mL	40 µg/mL	20 µg/mL
Standard Levofloxacin	17.34	15.31	13.34	9.90
Sample Levofloxacin	17.21	15.49	12.11	10.33

Determination of antibiotic comparison test value was done by making a curve between log concentration and inhibitory diameter and then obtained by linear regression equation. After the calculation, the result of the equation for the standard is y = 12.10x - 5.9516 with R^2 = 0.9949, while the result of the equation for the sample is y = 11.5x - 4.844 with the value R^2 = 0.9971. The curve between the concentration log and the inhibitory diameter for the standard and the sample can be seen in Figure 1 and 2.

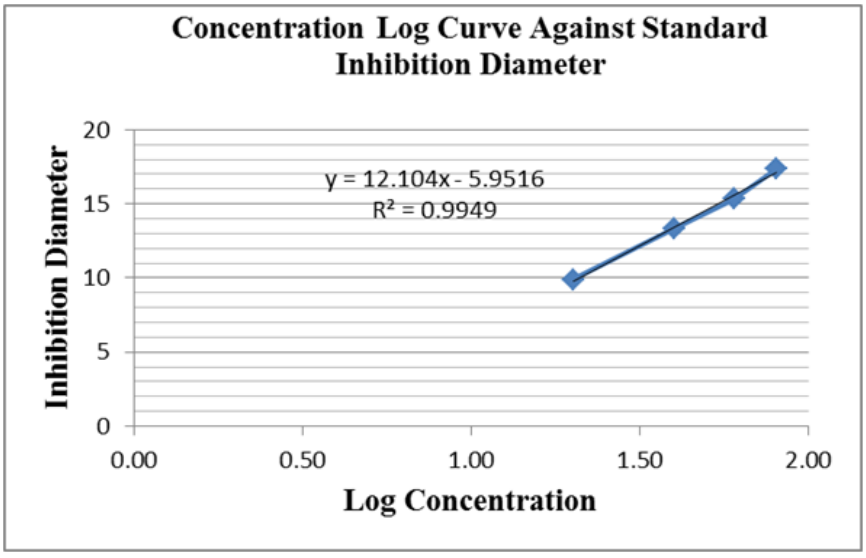

Figure 1: Log concentration curve against standard inhibitory diameter.

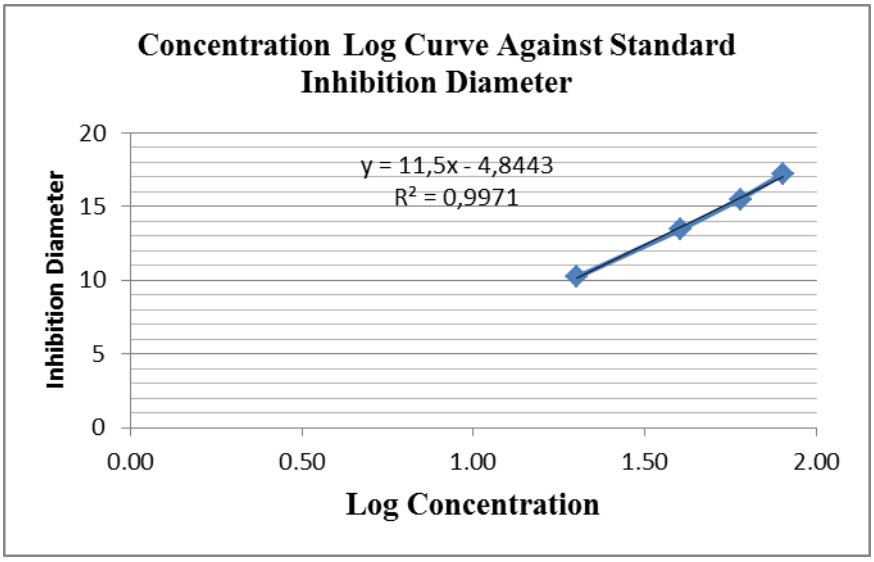

Figure 2: Log concentration curve against sample inhibitory diameter.

The concentration log of the standard antibiotic concentration is substituted as the value of x in the standard equation, so that the value of the inhibitory zone diameter or y value is obtained. Then, the value of y is inserted into the sample equation, so that the value of x is obtained. The antilog value of x is the value of the antibiotic concentration of the sample which is equivalent to the reference standard concentration with the same inhibitory zone diameter. Subsequently, a graph of antibiotic appellate sample values with standard antibiotics was prepared. The graph of the sample and standard antibiotic appellate values can be seen in Figure 3.

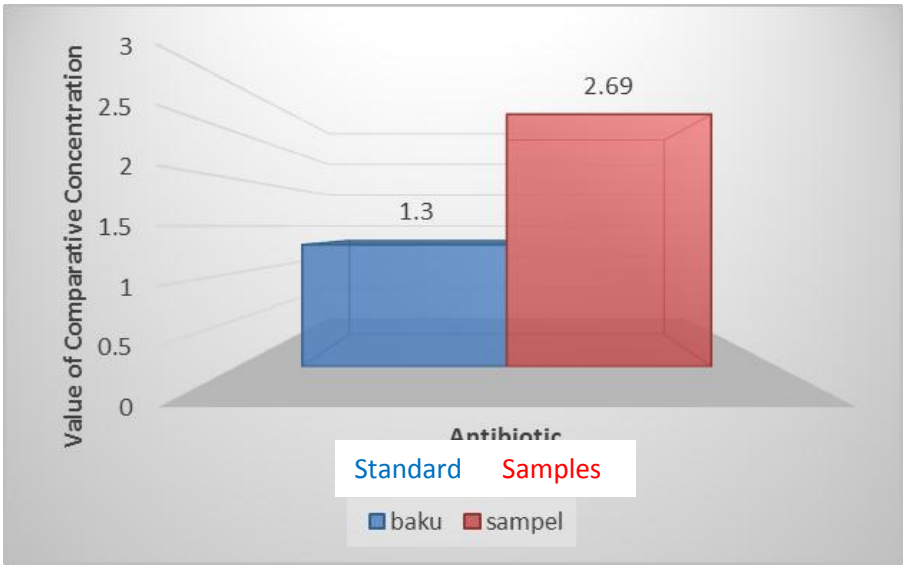

Figure 3: Comparative test values of antibiotic samples and standards.

The test results obtained comparison between the standard with the sample was 1: 2.69. This suggests that levofloxacin sample antibiotics used in Tasikmalaya city health centers have the ability to kill sensitive clinical isolate bacteria slightly better than standard antibiotics.

CONCLUTION

The antibiotic potency of levofloxacin used in Tasikmalaya City Health Center is 102.03%. Results were still within the range required by the USP 97% -120% (USP, 2014). The results of comparative antibiotic activity testing showed that the antibiotics used had slightly better activity than the standard with the value 1: 2.69.

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