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ANTIBIOTIC EVALUATION OF COMMERCIAL TETRACYCLINE USED IN ONE OF PUBLIC HEALTH CENTRES IN INDONESIA

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ABSTRACT

This study was aimed to evaluate the potency of tetracycline commercial antibiotic compared with the standard against *Staphylococcus aureus* ATCC 29737. The potency of tetracycline was conducted using the agar diffusion method using 3+3 design. The inoculum of S. aureus was prepared by suspending the bacteria colony into sterile normal saline solution and the turbidity was adjusted to 0.5 Mc Farland. The results showed that tetracycline commercial potency was 102.76%. So, it could be concluded that the commercial tetracycline use in one of Publich health in Indonesia are safe and proper antibiotics as acute respiratory infection drugs.

KEYWORDS: tetracycline, potency, commercial, *Staphylococcus aureus.*

INTRODUCTION

Tetracycline are one of the primarily antibiotics used for treating acute respiratory infection. But due to their extensive usage, an increasing number of pathogenic showing tetracycline resistance and limits the use of these agents in treatment of disease. The widespread use of tetracyclines for over 60 years increased the spread of acquired tetracycline-specific resistance mechanisms among clinically important bacterial pathogens, severely limiting the utility of legacy tetracyclines, such as tetracycline, doxycycline, and minocycline (Roberts, 2005). Antibiotic-resistant bacteria are spreading at an alarming rate in both hospital and community settings, severely limiting the utility of all classes of antibiotics and prompting initiatives toward new antibiotic development (Infectious disease, Tract, 2010; Lauternbach, 2007; Rice, 2006; Spellberg, 2008). These tetracycline resistance genes are generally present on transmissible genetic elements which can rapidly disseminate throughout diverse bacterial populations (Trudy, 2012). The *tet* (M) and *tet* (O) genes are the most prevalent RPP mechanisms, commonly found in aerobic and anaerobic Gram-negative bacteria (e.g., Enterobacteriaceae, Bacteroides spp.) and Gram-positive bacteria (e.g., Streptococcus spp., Enterococcus spp., Staphylococcus spp.) (Bryan, 2004). Among the above bacteria, some of the bacteria were pathogens of acute respiratory tract infections (Achmadi, 2004). It is suspected correlated with the increasing number of patients with respiratory infection.

Therefore an accurate terms measurement of potency is very important in proper use of antibiotics. 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 (Nishant et al, 2015; Prescott, 2008). 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 (Branson, 2001).

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), tetracycline standard, tetracycline commercial, and hydrochloric acid.

Bacterial

The bacterium used in this study was *Staphylococcus aureus* ATCC 29737.

Methods

Preparation of Bacterial Suspension

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 measured using a standard 0.5 Mc Farland.

Determination of Antibiotic Potency Test

The determination of tetracycline antibiotic potency was performed using the agar diffusion method using a perforation technique. The tetracycline antibiotic solution was prepared by weighing it in the equivalent of 10 mg of pure tetracycline then crushed it. Thereafter, 0.1N HCl is added until dissolved and added with sterile distilled water up to 100 mL volumetric flask and then homogenized. The solution is only last for one day. Then tetracycline was diluted using sterile distilled water to achieve the concentration of 0.5 µg/mL, 0.25 µg/mL, and 0.125 µg/mL. A total of 20µL bacterial suspension equivalent to 0.5 Mc Farland was dropped into a sterile petri dish, then a volume of 20 mL MHA was poured into the petri dish. The medium was homogenized and allowed to solidify. The bottom of petri dish was then patterned into six areas and each of the areas drilled using perforator aseptically. Each hole is then filled with a solution antibiotics and standard samples in accordance with the variations in concentration in 50 uL. All the medium test was incubated at 37 ° C for 18-24 h. Potency value was calculated using 3+3 design calculation.

RESULT AND DISCUSSION

Potency Antibiotic Result

The result of the potency tetracycline determination showed that *S. aureus* was sensitive against tetracycline. The result can be seen in Table 1.

Table 1: Diameter of zone inhibition.

Samples	Diameter (mm)
High concentration of tetracycline Standard	12.25±0.05
Medium concentration of tetracycline Standard	11.20±0.00
Low concentration of tetracycline Standard	10.34±0.02
High concentration of tetracycline commercial	12.30±0.01
Medium concentration of tetracycline commercial	11.07±0.00
Low concentration of tetracycline commercial	10.44±0.02

Note: Perforator diameter = 9 mm

By using the formula 3+3 calculation, the value of tetracycline commercial potency was 102.76%. These results indicated that a tetracycline antibiotic fulfilled the requirement of Indonesian Pharmacopoeia, not less than 97.5%. It showed that the commercial antibiotics that used in one of Health Centre in West Java would be effective in treating acute respiratory infection since the bacteria were sensitive. The loss of effective antibiotics will worsen antibiotic ability to fight infectious disease. If there is an increase in morbidity due to upper respiratory tract infection, it is possible for bacterial resistance to tetracycline.

CONCLUSION

Our results demonstrated that the potency of tetracycline commercial that were used at one of public health centers in West Java, Indonesia was 102.76% against *S. aureus* ATCC 29737.

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