

Study on the Method of Antibiotic Ointment to Control Bacterial Contamination

Yanli Zhuo*

Shenyang Institute for Food and Drug Control, Shenyang 110000, Liaoning Province, China

*Corresponding author: Yanli Zhuo, zhuoyanli66@sina.com

Abstract: *Aim:* To analyze the effective methods of antibiotic ointment to control bacterial growth, and to provide references for the research work of related personnel. *Method:* In this experiment, membrane filtration method combined with centrifugal precipitation method was used to complete the inspection of antibiotic ointment, and the final result was analyzed. *Results:* The application of membrane filtration method combined with centrifugal precipitation method to complete the test of antibiotic ointment has a significant effect. The test solution is milky white. The possibility if it can exert the effect of eliminating antibacterial components, so that *Pseudomonas aeruginosa* and *Staphylococcus aureus* can show an affecting state in the positive test tube, and colonies can be found after observation. *Conclusion:* The application of membrane filtration method combined with centrifugal precipitation method to complete the inspection of antibiotic ointment can achieve satisfactory results. The method is simple to operate and has high feasibility. It is worthy of further promotion and application.

Keywords: Control bacteria test; Antibiotic ointment; Method; Analysis

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1. Introduction

Antibiotic ointment is a common medicine for clinical treatment of diseases. It is an antibiotic preparation for use on the skin. There are two forms of antibiotic ointment: eye ointment and ointment. Many studies have revealed that the purpose of patients using antibiotic ointment is to improve their body's overall ability to resist inflammation while also achieving a local antibacterial effect. However, it should not be overlooked that a few patients who applied antibiotic ointment or eye ointment contaminated with bacteria, that their condition worsened, and some even became blind as a result. It can be seen that it is extremely important to test the safety of antibiotic ointment and ensure the effectiveness of the ointment ^[1]. Before administering drugs to patients, the antibiotic ointment should be tested in conjunction with relevant regulations and requirements, and the microbiological test of the antibiotic ointment should also be done. Nowadays, China has created relatively strict standards for the application of antibiotic ointment. These ointment preparations require microbiological testing before application. However, it cannot be ignored that the final inspection result will be affected by many aspects, so it is very prone to inspection failures and errors. It can be seen that it is extremely important to use reasonable and effective methods to test the microorganisms of antibiotic ointments. In order to comprehensively analyze the effect of the application of membrane filtration method combined with centrifugal precipitation method for antibiotic ointment inspection, combined with the actual situation, this article analyzes the above propositions, and now makes the following report.

2. Information and methods

2.1. Baseline data

This experiment uses an electronic weighing scale produced by GE in the United States. The minimum value is 0.1g and the maximum weighing value is 200g. It has relatively high accuracy and sensitivity. The maximum speed of the centrifuge (produced by Japanese Toshiba) is 4000rpm. Shanghai, the negative pressure filter equipment produced by Pujiang Medical Equipment Factory. The diaphragm vacuum pump produced by Chengdu Xinweicheng Technology Co., Ltd., with a pore size of 0.45 μ m. Experimental strains: *Staphylococcus aureus*, *Pseudomonas aeruginosa*. All of the above strains have been tested for Chinese pharmaceutical and biological products. Experimental reagents: Isopropyl myristate, Tween-80, Span-80, and glycerol monostearate, etc. Experimental test products: chlortetracycline hydrochloride ointment (1 batch), erythromycin ointment (3 batches), tetracycline ointment (1 batch), chlortetracycline ointment (1 batch), tetracycline ointment (1 batch), Erythromycin Ointment (8 batches). All preparations are formulated by China's Food and Drug Administration. Consider bile salt lactose and broth as a medium.

2.2. Method

In this experiment, membrane filtration method combined with centrifugal precipitation method was used to complete the inspection of antibiotic ointment. The specific plan was:

- (1) Using an electronic weighing scale, weighed out 5g of polysorbate-80, put it in a beaker, and sterilize it for 30 minutes and set the temperature to 121 $^{\circ}$ C. Prepared the pre-prepared dissolving reagent, and then treated the beaker in a water bath at a temperature of 45 $^{\circ}$ C. Weighed a total of 10g of the test product, put it into a hot dissolving beaker containing emulsifier, and put it in a water bath at a temperature of 45 $^{\circ}$ C. Mixed well, added 80ml tryptic soy peptone liquid medium. Set the temperature to 45 $^{\circ}$ C, mixed thoroughly, put 20ml of tryptic soy peptone liquid medium, and set the relevant ratio to 1:10. Placed 1ml each of *Pseudomonas aeruginosa* and *Staphylococcus aureus* into each, and mixed well.
- (2) Prepared the centrifuge tube, added the prepared positive test solution into the centrifuge tube, and centrifuge at 3000 rpm for 5 minutes. Collected 0.2 ml of the lower layer of bacteria liquid, mixed it with 10 ml of tryptic soy peptone liquid medium, shook well, and performed a second centrifugation. The conditions were as above. Collected a total of 1 ml of the bottom layer of bacteria and put it into trypticase soy peptone liquid medium. Mixed well and took out the membrane filter.
- (3) The filter membrane was rinsed. Used 0.1% sterile sodium chloride peptone water for a total of 1000ml for flushing. After that, prepared the culture medium properly and took the culture solution. Placed it in each medium plate, the temperature was 37 $^{\circ}$ C, the time was set to 18-24hrs, and checked the results.

2. Results

The application of membrane filtration method combined with centrifugal precipitation method to complete the test of antibiotic ointment has a significant effect. The test solution was milky white. It can exert the effect of eliminating antibacterial components, and can make *Pseudomonas aeruginosa* and *Staphylococcus aureus* show an appreciation state in the positive test tube, and colonies could be found after observation.

3. Discussion

In clinical practice, antibiotic ointment is divided into two categories, eye ointment and ointment. When the antibiotic ointment is applied to the affected part or wound of the patient, it will exert an effective anti-infection and antibacterial effect. This drug has obvious antibacterial sensitivity. Relevant literature confirms that, compared with internal antibiotics, the antibacterial efficiency of topical antibiotic ointment will be several dozen times higher. It is also worth noting that ^[2], the sterilization and antibacterial effects

of such drugs against gram-positive bacteria are also quite significant. The main reason is that the antibiotic ointment can effectively inhibit the isoleucine tRNA synthetase in the bacteria, thus showing the effect of preventing the bacteria from binding to protein. The incidence of adverse reactions in patients with rational use of antibiotic ointment is low. However, it is worth noting that when affected by various external factors, patients may have some adverse reactions.

Literature has shown that, *Pseudomonas aeruginosa* and *Staphylococcus aureus* are two types of inhibitory bacteria that will destroy the ingredients of antibiotic ointment, and then contaminate drugs [3]. The above bacteria are widely present in people's living environment, such as drinking water, air and soil, there are a large number of bacterial patina *Pseudomonas aeruginosa* is easy to grow and multiply in a relatively humid environment. *Staphylococcus aureus* is a relatively common pathogen, it grows well in ordinary culture media and does not require high nutrition. This kind of pathogenic bacteria is facultative anaerobic/aerobic. The suitable pH value is 7.4, and the growth temperature is about 37°C. It is glossy and thick in the plate, showing a round bulge, with a diameter of 1.0-2.0mm. Around the colony on the blood plate, a transparent hemolysis ring can be formed. This type of pathogenic bacteria has relatively high salt tolerance and can grow freely in a broth medium with a concentration of 10.00% to 15.00%. *Staphylococcus aureus* has the characteristics of acid production but not gas production, and it can decompose sucrose, lactose, maltose and glucose. Its ability to react with methyl red is a positive result. The VP reaction is a weakly positive result. Many strains of *Staphylococcus aureus* can hydrolyze urea, decompose arginine, liquefy gelatin substances, and can reduce nitrate. *Staphylococcus aureus* can survive for several months in a relatively dry environment. It is widely distributed in the air but does not multiply. When the opened antibiotic ointment is exposed to the air, it is extremely susceptible to contamination by *Staphylococcus aureus*. It can be seen that the application of effective methods to properly preserve the antibiotic ointment is of great significance to improve the safety of the application of the drug. For the antibiotic ointment that has been opened, if it is detected that it contains *Pseudomonas aeruginosa* and *Staphylococcus aureus* in excess of the number, it should be immediately discarded and not used again. Relevant literature points out [4] that as antibiotic ointment contains a large amount of antibacterial ingredients, the application of conventional inspection methods to complete the inspection work is very easy to cause deviations in results or lead to inspection failures. It can be seen that it is of great significance to choose an effective method to complete the bacterial composition test of antibiotic ointment.

Based on this situation, this experiment used the membrane filtration method combined with the centrifugal precipitation method to complete the antibiotic ointment test. The results show that the application of the above two methods can effectively detect *Pseudomonas aeruginosa* and *Staphylococcus aureus*. After observing the positive tube, it can be found that there are colonies inside. Additionally, it can effectively expel foreign bacteria. The experimental research results of this group show that the application of the above two methods to complete the inspection of antibiotic ointment is feasible. The centrifugal precipitation method mainly refers to the centrifugal treatment of emulsifiers and food supplies by the centrifugal effect of the centrifugal equipment used for high-speed rotation. After that, adding Tween sodium chloride can effectively separate the contaminants of foreign bacteria and place it in the lower sedimentation solution. After that, the membrane filtration method is used to complete the filtration work, and Tween sodium chloride solution is added to effectively clean the filter membrane. As well as, put the centrifugal liquid in the filter membrane to complete the filtration. Using this operation can play the fundamental purpose of efflux of probiotic ingredients [5].

In general, the application of membrane filtration method combined with centrifugal precipitation method to complete the inspection of antibiotic ointment can achieve satisfactory results. The method is simple to operate and has high feasibility. It is worthy of further promotion and application.

Disclosure statement

The author declares no conflict of interest.

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