Study on Medicinal Plant Active Substances Extraction and Antibacterial Activity of Houttuynia Cordata

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Abstract: This study was about the effective component extraction from Houttuynia cordata by steam distillation and antibacterial effect on Escherichia coli, Staphylococcus aureus and Bacillus subtilis. The extraction of Herba Houttuyniae extract of Escherichia coli, Staphylococcus aureus and Bacillus subtilis were certain inhibitory effect of, which inhibitory effect on Staphylococcus aureus the most obvious.

1. Introduction
Houttuynia cordata for the three grass grass plants with roots of the whole plant, fresh plants broken pungent smell, widely distributed in central China, southeast and southwest provinces, especially in Hubei, Hunan, Jiangsu, Sichuan and other provinces[1]. Houttuynia is rich in protein, vitamins, oils and other nutrients, is one of the commonly used wild vegetables; also has a heat detoxification, eliminate carbuncle pus, diuretic Tonglin and other effects, Chinese medicine used in lung abscess spit, phlegm Cough, heat dysentery, hot carbuncle swollen sore and other diseases of the treatment, so the Ministry of Health has been officially identified as both a drug and food development potential of one of the plant resources.

Houttuynia has antibacterial effect, all kinds of microorganisms have inhibitory effect on Staphylococcus aureus, hemolytic Streptococcus, Casecoccus, pneumococcal influenza bacteria have a significant inhibitory effect. Houttuynia has antiviral effect, containing quercetin and isoquercitrin, quercetin and other flavonoids, have significant anti-inflammatory effect[2]. Houttuynia active substances are anti-atherosclerosis, reduce diabetic rats kidney damage and other effects[3].

1.1 Extraction of active substances from Houttuynia cordata Thunb: A certain amount of Houttuynia samples were ground, called 100.0g into the steam distillation device. Add water and heat for 4h; collect the distillate, pour the collected mixture into the separatory funnel, add a certain amount of water The amount of petroleum ether is extracted. Repeated water vapor distillation extraction multiple times combined with petroleum ether extract, filtered, vacuum evaporation to remove the solvent, you can get dark yellow extract, the extract is dry. The yield was calculated by weighing the extract with an electronic balance.

1.2 Antibacterial experiments: After the plate was solidified, the 0.1mL of the E. coli suspension was added to the plate with a sterile pipette, and the suspension was evenly coated on the plate using an applicator to prepare a plate containing Escherichia coli. The filter paper wafer with diameter of 6mm was dry heat sterilized for 2h, immersed in the sample for 30min on the sterile table, and the solvent
was evaporated and the filter paper was attached to the above-mentioned E. coli-containing plate.
After 1 hour of incubation at room temperature, E. coli was placed in a 37°C incubator for 18-24h
after incubation. In addition to Staphylococcus aureus and Bacillus subtilis antibacterial test operation
ibid.After incubation for 18-24 h, remove the culture dish, open the lid of the culture dish, remove the
filter paper with tweezers, and then cover the glass cover. Observe the occurrence of the inhibition
zone and diameter, with a vernier caliper to cross the cross method to measure the diameter of the
inhibition zone, record, and calculate the average diameter of the inhibition zone.

2.1 Experimental results and discussion

2.1.1 Extraction rate of active substance from Houttuynia cordata Thunb: Houttuynia after grinding
water bath heating, steam distillation extraction 4h. The distillate was collected and the collected
mixture was poured into a separatory funnel and added with a quantity of petroleum ether. Repeated
water vapor distillation extraction several times, combined with petroleum ether extract, filtered,
decompression rotary evaporation to remove the solvent, that is, Houttuynia active material extract.
The results showed that 0.0392 g of the active substance could be extracted from 100.0 g of
Houttuynia cordata under the best extraction condition by steam distillation. The extraction yield was
0.039%.

2.1.2 Antibacterial results of Escherichia coli: The effect of Houttuynia cordata active substance on
Escherichia coli was studied. The extract of Houttuynia cordata was added to Escherichia coli by
antibacterial experiment. The antibacterial effect was observed and the diameter of the inhibition zone
was measured. The results are shown in the following table 1.

| Table1. Bacteriostatic diameter of extract of Houttuynia cordata Thunb on E. coli |
|------------------|---|---|---|
|                  | Hc1| Hc2| C1| C2 |
| Diameter1 /mm    | 9.2| 9.3| 0 | 0  |
| Diameter2 /mm    | 9.5| 8.6| 0 | 0  |
| Diameter3 /mm    | 8.9| 9.2| 0 | 0  |
| Diameter4 /mm    | 8.7| 8.3| 0 | 0  |
| Averagediameter/mm| 9.0| 8.8| 0 | 0  |

The results showed that the average value of the extract of Houttuynia cordata active substance on
E. coli was 8.9mm, which had certain antibacterial effect on Escherichia coli. The average diameter of
bacteriostatic diameter of sterile water control group was 0mm, sterile water No inhibitory effect on E.
coli. It can be seen, Houttuynia active substance extract on E. coli has antibacterial effect, sterile water
no bacteriostatic effect.

2.1.3 Staphylococcus aureus test results: Houttuynia cordata active substance on Staphylococcus
aureus, the Houttuynia cordata extract was added to Staphylococcus aureus by antibacterial experiment operation. The antibacterial effect was observed and the diameter of the inhibition zone
was measured. The results are shown in the following table 2.

| Table2. Bacteriostatic diameter of extract of Houttuynia cordata Thunb on Staphylococcus aureus |
|---------------------------------------------|-----------------|---|---|
| Diameter1 /mm                              | 15.2            | 13.9| 0  | 0  |
| Diameter2 /mm                              | 13.8            | 13.6| 0  | 0  |
| Diameter3 /mm                              | 14.2            | 14.2| 0  | 0  |
| Diameter4 /mm                              | 13.2            | 14.4| 0  | 0  |
| Averagediameter/mm                         | 14.1            | 14.0| 0  | 0  |
The results showed that the extract of Houttuynia cordata had some bacteriostatic effect on Staphylococcus aureus representing Gram-negative bacteria, and the antibacterial effect was obvious, and the antibacterial diameter was 14.1mm. The average bacteriostatic diameter of the sterile water control group was 0mm, which had no inhibitory effect on Staphylococcus aureus. It can be seen, Houttuynia active substances on Staphylococcus aureus have a better antibacterial effect, sterile water on Staphylococcus aureus no bacteriostatic effect.

2.1.4 Antibacterial results of Bacillus subtilis: The effect of extract of Houttuynia cordata on Bacillus subtilis was studied. The extract of Houttuynia cordata was added to Bacillus subtilis by antibacterial experiment. The bacteriostatic effect was observed and the diameter of the inhibition zone was measured. The results are shown in the following table3.

| Diameter1 /mm | Hc1 | Hc2 | C1 | C2 |
|---------------|-----|-----|----|----|
| Diameter2 /mm | 9.3 | 9.6 | 0  | 0  |
| Diameter3 /mm | 8.9 | 9.2 | 0  | 0  |
| Diameter4 /mm | 9.4 | 8.4 | 0  | 0  |
| Average diameter/mm | 9.35 | 9.0 | 0  | 0  |

The results showed that the active substance of Houttuynia cordata had some bacteriostatic effect on Bacillus subtilis of Gram-positive bacteria, and the average diameter of antibacterial diameter was 9.1mm. The average diameter of antibacterial diameter of sterile water control group was 0mm, and it had no bacteriostatic effect on Bacillus subtilis. Thus, Houttuynia effective substances on Bacillus subtilis have antibacterial effect, sterile distilled water on Bacillus subtilis no bacteriostatic effect.

Houttuynia cordata extract on E. coli, Staphylococcus aureus, Bacillus subtilis have a certain antibacterial effect, antibacterial diameter of a certain difference, which Staphylococcus aureus antibacterial diameter of the largest, the most obvious antibacterial effect.

3. Conclusion
With the long-term use of organic chemical pesticides, many drawbacks are also increasingly prominent, such as bacterial resistance, environmental pollution, the harm to health, etc., has become a concern in society. Therefore, it is very important to develop new bioactive antimicrobial substances from medicinal plants and functional health substances, which is of great significance to the development of ecological agriculture, the maintenance of natural balance and the protection of human health [4-5].

In this study, the extract of Houttuynia cordata Thunb was significantly inhibited by the extract of Houttuynia cordata Thunb. On the pathogen of three kinds of pathogens. It can provide theoretical basis and research for the preparation of products with Houttuynia as the main component in the future, but further research is needed for drug screening of specific pathogens.

References
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