Antibacterial activity of traditional herbal medicine

Qiqi He, Chen Situ, Queen’s University Belfast, UK.  
✉ qhe03@qub.ac.uk

Introduction

Antimicrobial resistance (AMR) is becoming the biggest threats for human and animal health that has accelerated the search for new antimicrobial agents to be used from nature. Initial research estimated that a continued rise in antimicrobial resistance by 2050 would lead to 10 million people dying every year. WHO shows a serious lack of new antibiotics under development to combat the growing threat of antimicrobial resistance. It is apparent that novel new antimicrobial agents are urgently warranted to against these resistant pathogenic strains. This project aims to investigate and evaluate the potential antibacterial activity of herbal medicinal plant against some of the resistant pathogens chosen from WHO antibiotic resistant priority list including methicillin-resistant Staphylococcus aureus (MRSA) and Acinetobacter baumannii.

Methods

The plant materials were grinded, and extracted with boiling water. After sonification, plant extracts were subjected to antimicrobial testing using broth microdilution method. MIC is the lowest concentration of an antimicrobial agent (in mg/l) prevents the appearance of visible growth of bacteria within a defined period of time.

The aim of kinetic study was to track the inhibitory behaviour of plant extract against resistance bacterial by determining the optical density (OD) at a period of 24 hours. A microplate reader (Biotek Synergy HT, UK) was used for incubation and reading of microplates. MRSA (NCTC 12493) was incubated with botanicals which have low MICs. Incubation was performed at a temperature of 37.0±1.0 °C for a period of 24 hours. Absorbances were measured at 600 nm at intervals of 30 minutes.

Results

- **Broth micro-dilution test results**
  
  MIC of sample No.8 C.Rhizome (MIC 15.6mg/l) and No.20 Rhubarb (MIC 7.8mg/l) were tested as follows. Fig 1 and Fig 2 were showed the MIC of some tested plant extracts for MRSA (NCTC 12493) and A.baumannii (NCTC 12156). An example of No.8 C.Rhizome (MIC 15.6mg/l) and No.20 Rhubarb (MIC 7.8mg/l) were showed in Fig 3, suspensions from wells showed no visual growth were plated out for further incubation to establish the minimal bactericidal concentration of plant extracts after obtaining the MIC, this is to confirm that at higher concentration can not only inhibit the growth but also kill the bacteria.

- **Kinetic Study results**
  
  Absorbance of plant extracts at the MIC (0.0156mg/ml) and 1mg/ml respectively were compared with antibiotic control, including Rhubarb, P.Cuspidate, A.Pilosa, C.Rhizome, R.Smilacis and R.Lithospermi.

Conclusion

Preliminary results showed 75% exhibited the growth MRSA (NCTC 12493) and similar antibacterial efficiency as compared to the vancomycin (positive antibiotic control) was observed from some of the plant extracts, while 21% shows an inhibitory effect against Acinetobacter baumannii (NCTC 12156). In addition, significant inhibition against MRSA was showed in kinetic study, when the sample concentration increase from MIC level to 0.25mg/ml, A.Pilosa and Rhubarb were similar to that of antibiotic positive control. The potential plant candidates are subjected further studies including toxicological profiling and synergistic study.

Future Plan

References