Antimicrobial activity of methanol extract of Anziroat (Astragalus sp)

Abdullah M. Albaqawi, and Samy A. Selim

Abstract—In order to validate its antiseptic properties with respect to traditional uses, we have screened the antimicrobial activity of Anziroat against different pathogenic microorganisms. The agar disk diffusion method was used to study the antibacterial activity of Anziroat against 6 bacterial strains and one yeast strain. The disc diameters of zone of inhibition (DD) was investigated to characterize the antimicrobial activities of this compound. The antimicrobial activity of the extract was investigated in order to evaluate its efficacy against the different tested microorganisms. The present results showed a significant activity against microorganisms with inhibition zones in the range of 12-20 mm. This investigation showed that Anziroat has a potent antimicrobial activity against E. coli and Staphylococcus aureus. Further research is required to evaluate the practical values of therapeutic applications.

Keywords—Antimicrobial, methanol extract, Anziroat (Astragalus sp), pathogenic microorganisms.

I. INTRODUCTION

In recent decades, many studies have been carried out on different plant species to discover compounds of possible interest for medicinal application against various diseases, such as cancer, oxidative stress, and fungal, viral, and bacterial infections. Among these studies, several have focused on the biological and phytochemical properties of different species of Astragalus, the largest genus of the family Fabaceae and, with over 2500 species, probably the largest genus of flowering plants [1]. Several species of this genus are used in folk medicine due to their hepatoprotective, antioxidative biological activities and their antiviral properties [2]. In Turkish folk medicine, the roots of Astragalus species are used for the treatment of leukemia and for the healing of wounds [3]. Furthermore, A. mongholicus Bunge and A. membranaceus Bunge are among the most popular Chinese medicines and are used for a variety of diseases, including as an adjunctive in cancer chemotherapy [4-6].

Some Astragalus products, such as gum tragacanth, are widely in use in the preparation of pharmaceuticals and as thickening agents in certain foods [7]. Some products may even have applications in controlling cancer cells [8]. Among the different compounds used from Astragalus, saponins extracted from A. corniculatus M. Bieb. have an antineoplastic effect against myeloid Graffi tumors in hamsters [9]. Antibacterial activity has also been reported for some Astragalus species, such as A. gymnolobus Fisch. and A. brachystachys DC. [10,11]. In addition, bioactive saponins have been extracted from A. suberi L. [12]. Gođevac et al. investigated the antioxidant activity of methanol extract from the aerial part of A. glycyphyllos L. [13]. Another study showed that an ethanol extract of A. membranaceus roots may inhibit the growth of Trypanosoma cruzi [14].

In this study, we describe the antimicrobial activity of the Anziroat methanol Extract.

II. MATERIALS AND METHODS

A. Preparation of Extract

Anziroat were obtained from local market at Al Jouf, Saudi Arabia. Powder was air dried at room temperature and grounded to coarse powder. 0.15g of the powder was placed in 100ml of distilled methanol (80%) in conical flask and The crude preparation was left overnight in the shaker at 350°C and then centrifuged at 2500rpm for 10 mins. The supernatant containing the plant extract was then transferred to a preweighed beaker and the extract was concentrated by evaporating the solvent at 60°C. The crude extract was weighed and dissolved in a known volume of dimethyl sulfoxide, to obtain a final concentration of 200mg / ml and sterilized by filtration through (0.45 μm) Millipore filters. The extracts were stored in sample bottles at 4oC prior to use.

B. Microbial Cultures

Six strains of bacteria were used as test microorganisms. All microorganisms were clinical isolates, obtained from the Microbiology Laboratory at Department of Medical Laboratory Sciences, College of Applied Medical Science, Aljouf University. Standardization of inoculum exactly 0.2ml of 24/hours old culture of each organism was dispensed into 20ml of sterile nutrient broth and was incubated for 3-5/hours to standardize the culture to 106cfu/ml. Antibacterial Testing: This was done using the agar wells diffusion method. 0.5ml of overnight broth culture of each clinical isolates containing 106 cfu/ml was ascetically transferred to the solidified nutrient agar
and spread evenly on the agar surface using a sterile glass spreader. Four 6mm wells were bored unto the agar and filled with the extracts (cold water extract) while the distilled water serves as the control. The Petri dishes were incubated at 370C for 18-24/hr and the inhibition zones were measured (mm).

C. Time-kill assay

As the screening of extracts revealed that Anziroat extract gave the strongest antistaphylococcal activity, it was used for the time-kill assay [10]. Growing culture (10^6 cfu/ml) of representative Staphylococcus aureus was added to nutrient broth and exposed to 5 and 10 mg/ml of extract, and extract free medium was used as growth control. Samples were removed for colony counts at 0, 2, 6, 24 and 48 h. The viable counts were determined using the serial dilution method after incubation. The procedure was repeated in triplicate, and the log10cfu/ml was plotted against time. All assays were carried out in triplicates.

III. RESULTS AND DISCUSSION

The antibacterial activities of extracts were evaluated by the diameter of the inhibition zone around the well; these diameters are reported in Table 1. The result in Table 1 and Figures 2 revealed that, the well diffusion method evaluated the antimicrobial activity of Anziroat extract. No antimicrobial activity of most extracts was found against Proteus mirabilis, Pseudomonas aeruginosa and Streptococcus sp. Thus, many of the tested extracts were found to be active against S. aureus and E. coli.

In a study by Türker et al. [11], aqueous, methanolic, and ethanolic extracts of A. gymnolobus Fisch. showed inhibition zones against Aeromonas hydrophila with diameters of 7.75, 8.50, and 7.25 mm, respectively. On the other hand, these 3 extracts were found to be inactive against Yersinia ruckeri, Streptococcus agalactiae, Lactococcus garvieae, and Enterococcus faecalis. Another example concerning active compounds from Astragalus species was provided by Jassbi et al., who indicated that isolates from A. brachystachys showed antibacterial activity against Bacillus subtilis. Disks charged with 40, 80, 120, 160, and 200 μg of sclareol showed 8, 9, 10, 11, and 18-mm inhibition zone diameters, respectively [10]. Their results revealed that they were potent anti-bacterial agents against bacteria.

Time kill assay of Anziroat extract was performed for Staphylococcus aureus, it was depended on time and concentrations of extract. At 10 mg, the strain was killed after 6 hr (Figure 3).

IV. CONCLUSIONS

In the present study, Anziroat demonstrated promising antimicrobial activities against microorganisms. The use of this plant in the treatment of microbial infection, scientifically supported by the results obtained in this work.

ACKNOWLEDGEMENTS

This work was funded by the Deanship of Scientific Research (DSR), Al Jouf University, Al Jouf, KSA, under student grant (First term/1435-1436). The authors, therefore, acknowledge with thanks DSR technical and financial support.

CONFLICT OF INTEREST STATEMENT

No conflict of interest was declared.

REFERENCES


http://dx.doi.org/10.1002/(SICI)1099-1573(199709)11:6<411::AID-PTR132>3.0.CO;2-6


