



STUDY A PLANT EXTRACT AS AN ANTIBACTERIAL AGENT

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ABSTRACT

Ulmus Ulmaceae (UU) is a bushy plant in Iran, which the plant has been applied as an ethnomedicinal plant in Iranian traditional medicine. In comparison to many other plants, there is a very little data about antibacterial properties of UU aqueous extract collected from Iran. In this work, effect of aqueous extract of UU on growth of *Staphylococcus aureus* ATCC No. 25923 (SA) in macro-dilution Mueller-Hinton broth, agar disk and agar well diffusion is indicated. MIC and MBC values were 0.125 and 0.5 g/ml concentration, respectively. By increasing the concentration of the UU extract, the inhibition zones increased. The present research shows the antibacterial effects of the medical plant on SA, suggesting to use as an antibacterial agent. Extraction of active molecules will be the future work to peruse.

INTRODUCTION

Plants are proving to be a substantial source of medicines for human being¹⁻³. The uses of plants in new drug discovery has been stated in novel reports. Plant have been applied for many thousands of years in pharmaceuticals, natural therapies and alternative medicine^{4, 5}. Many plants have been used because of their antibacterial effects, which are due to their compounds^{6, 7}. In vitro studies in the work indicated that the plants prevented bacterial growth but their effectiveness divers⁸⁻¹⁰. Plants extraction techniques played a significant role in antibacterial traits of these plants^{11, 12}. A plant extract is an active compound that is removed from the tissue of a plant with eligible effects, to be used for a certain purpose¹³. Herbal extracts have antibacterial activities on a large number of Gram positive and Gram negative bacteria¹⁴⁻¹⁷. In Iranian medicine, plant extracts are used by the people for the cure of diseases such as bacterial diseases¹⁸⁻²⁰.

In Kermanshah; in western states of Iran, a plant with the scientific name of *Ulmus Ulmaceae* (UU) has traditional medical applications. UU is a plant species in the family *Ulmaceae* of the *Rosales* order. The genus is concentrated in Iran. UU is one of the eatable plants which have yielded a lot

of interest throughout human history as a medicinal panacea. UU is known to have beneficial effects on a wide variety of diseases antimalarial, antiviral, antifungal, antioxidant, and anti-inflammatory²¹.

The aim of this study was to screen the in vitro antibacterial properties of the plant extract against some bacteria including SA.

MATERIALS AND METHODS

Staphylococcus aureus ATCC No. 25923 (SA) provided by The Iranian Research Organization for Science and Technology was activated on Tryptic Soy broth at 37°C for 18 h. Then 60 µl of the broth was transferred to base culture (Nutrient agar) and incubated at 37°C for another 24 h; cell concentration was then adjusted to acquire terminal concentration of 10⁸ cfu/ml in Muller Hinton broth. Mueller-Hinton Agar was prepared according to the manufacturer's instruction (Oxoid, UK), autoclaved and dispensed at 20 ml per plate in 12 x 12cm Petri dishes. Set plates were incubated overnight to ensure sterility before apply.

UU plants were collected in Kermanshah, Iran and were washed, air dried for 7-8 days, and ground into powder before

being placed into a Soxhlet device for extraction with distilled water with increasing polarity to extract phyto-constituents separately at 20°C for 3-4 h. Whitman filter papers No.1 were used to filter the extract. Pressure was decrease to evaporate and dry the filtrates (after drying, powder of aqueous extract are obtained).

Agar disk and agar well diffusion tests were done to calculate Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of UU to prevent SA. The solution of UU produced in 1g/ml from which six fold serial dilutions (v/v) of 60 µl were placed on each disk and well. Distilled water was applied as negative control and cephalixin as a positive control. After 24 hours incubation diameters of growth prevention zones around disks or wells were measured. For designation of MIC, the macrobroth dilution method was used²².

RESULTS

In agar disk diffusion the widest zone 12 mm occurred at 0.50 g/ml UU. There was no inhibition in 0.031, 0.015, and distilled water g/ml. Inhibition zones are shown in Table 1.

Table 1 Inhibition (mm) in agar disk diffusion at different dilutions of UU.

Dilution(g/ml)	Inhibition zone in disk diffusion (mm)
Microorganism	SA
Positive control	26
1/2 (0.50)	12
1/4 (0.25)	10
1/8 (0.125)	9
1/16 (0.062)	8
1/32 (0.031)	0
1/64 (0.015)	0
Negative control	0

In Agar well diffusion the widest zone 10 mm again was in 0.125 g/ml UU and no inhibition occurred in 0.062, 0.031, 0.015, and distilled water as shown in Table 2.

Table 2 Inhibition mm in agar well diffusion test in different dilutions of UU.

Dilution(g/ml)	Inhibition zone in well diffusion (mm)
Microorganism	SA
1/2 (0.50)	10
1/4 (0.25)	9
1/8 (0.125)	8
1/16 (0.062)	0
1/32 (0.031)	0
1/64 (0.015)	0
Negative control	0

MIC was 0.125 g/ml and MBC was 0.5 g/ml UU.

DISCUSSION

Plants contain ethnomedicinal properties which make them potent to cure or prevent bacterial infections^{23, 24}. Medicinal plants applied in Iranian traditional medicine are effective in treating different ailments caused by microbes²⁵⁻²⁷. In Iranian ethnomedicine, plants such as UU in the various form are used by the most of people for the treatment of bacterial illness²⁸.

The antibacterial results indicated that the aqueous extract of UU prevented the bacterium and the traits were dependent upon concentration. The results demonstrated that UU extract with 0.125 g/ml concentration has inhibited from the growth SA, also in 0.5 g/ml concentration has removed. In agar disk diffusion test, the widest inhibition zone was seen in 0.5 g/ml

concentration (The value of growth inhibition zone was 12 mm in this dilution, but the value of growth inhibition zone of Cephalixin against SA was 26 mm) and no inhibitory effects of distilled water against the SA. In agar well diffusion test, the widest zone was seen in 0.5 g/ml concentration (10 mm) and no inhibitory effects of extract of UU in 0.062, 0.031, 0.015 g/ml concentrations. Our results assert the use of this plant in traditional medicine and offer that UU aqueous extract have antibacterial activities. Thus, it can be used as antibacterial supplement.

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