Study the biological activities of *Avena sativa* extracts

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Part One Antimicrobial and diabetes management activities

***Abstract*—** The study the extract of the herb Avena sativa L. (Gramineae), from Iraq, was done by using of 70% ethanol as a solvent, the study the antimicrobial activity of the extract (in vitro) on gram positive bacteria (Staphylococcus aureus), and gram negative bacteria (E. coli, Proteus vulgaris, Pseudomonas aerugiuosa, and Klebsiella), A. niger, and Candida extrat showed considerable activity against all bacteria and fungi.

***Keywords*:** *antibacterial, Arena sativa, extraction, fungal*.

I. INTRODUCTION

Scientific experiments on the antimicrobial properties of the plants compounds were first documented in the late 19th century [1]. Plants are rich in a wide variety of secondary metabolites such as tannins, terpenoides, alkaloids and flavonoid, which have been found in vitro to have antimicrobial properties [2]. Extracts of many plants are now known to exhibit antimicrobial activity. The use of herbal medicine predates the introduction of antibiotics and predates social, economic and religious barriers[3].

Infectious diseases accounts for high proportion of health problems in the developing countries including India. Microorganisms have developed resistance to many antibiotics and as a result, immense clinical problem in the treatment of infectious diseases has been created [4]. The resistance of the organisms increased due to indiscriminate use of commercial antimicrobial drugs commonly used for the treatment of infectious disease. This situation forced the researchers to search for new antimicrobial substance from various sources including medicinal plants [5]. There are 2600 plant species of which more than 700 are noted for their uses as medicinal herbs [6]. In folk medicine, medicinal herbs and plant products were used in treating a wide spectrum of infections and other diseases. A survey of literature reveals that there are many essential oils which possesses antifungal activity [7-14].

The aim of this work was to study the biological activity of the Iraqi herb *Avena sativa* as antibacterial and antifungal activity.

II. EXPERIMENTAL

A. Extraction procedure

Avena satvia were collected from natural habitats during flowering. Air dried plant sample rinsed with water and dried. After evaporation of the solvent, the residue (250 g) was extracted with 500ml, 70% ethanol in a soxhlet apparatus and the extract was evaporated to dryness by a rotary evaporator.

B. Antimicrobial activity assays

Different test microorganisms were used which are: *Escherichia coli, Pseudomonas aeruginosa, Klebsiella, Proteus vulgaris and Staphylococcus aureus, A. niger, and Candida*. All test microorganisms were collected from Biotechnology division, Department of applied science, University of Technology. The identity of all the strains were confirmed. The *Avena satvia extract was* weighed and dissolved in dimethylsulfoxide (DMSO) to prepare extract stock solution of 100 mg/ml.

1. The antibacterial activity of the *Arena sativa* extract was studied against selected types of bacteria, in brain hart broth agar media, which is used DMSO as a solvent and as a control for the disc sensitivity test [15-17]. This method involves the exposure of the zone of inhibition toward the diffusion of micro-organism on agar plate. The plates were incubated for (24hr), at 37ºC. The

antimicrobial activity was recorded as any area of microbial growth inhibition that occurred in the diffusion area. The quantitative antibacterial activity assay was performed by the nutrient broth for bacterial.

2. Minimum inhibitory concentration (MIC) evaluation: The MIC was evaluated on plant extract that showed antimicrobial activity. This test was performed at four concentrations of the extract employing the same agar well diffusion method.
3. Antifungal Assay: Antifungal activity was tested using the agar dilution method [18]. Varying concentrations of the extract were prepared and incorporated into Potato dextrose agar. The plates were incubated at 25^0C for 48 hours and inhibition of growth was noted. The Minimum Inhibitory Concentrations (MIC) for the extract was recorded after 48 hours.

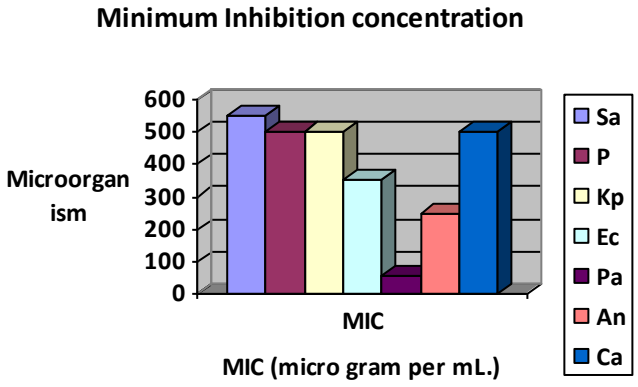
III. Results and Discussion

Antimicrobial activity of Arena sativa extract.

1: The determination of the MIC (Minimum inhibition concentration) by means of the agar diffusion assay (Figure 1) showed that plant extrac tested exhibited an antimicrobial effect against Gram positive bacteria, *Staphylococcus aureus* and Gram negative, *Klebsiella, Proteus vulgasis, Pseudomonas* and *E. coli in addition of A. niger, and Candida.*

FIGURE 1

The Minimum inhibition concentration [MIC(µg/mL.)] of *Avena sativa* extract

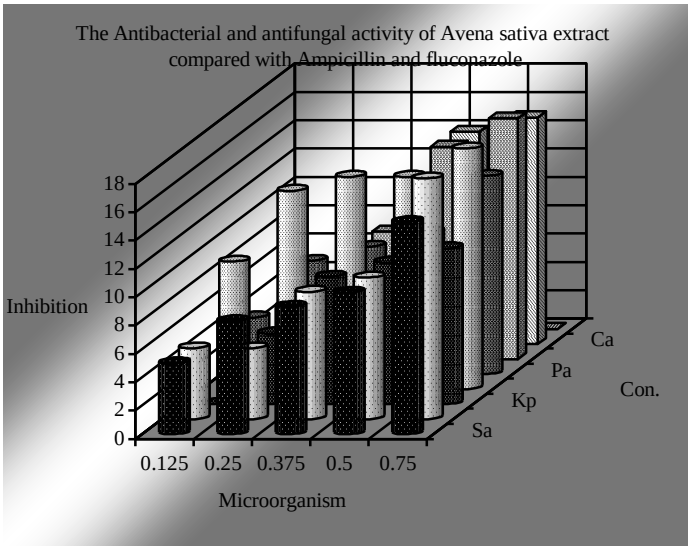


2: The Antibacterial activity of *Avena sativa* extract.

The antibacterial activities of the plant extract was evaluated by measuring the inhibition zone observed around the tested materials. In agar diffusion assay, the ethanolic extract of the plant showed considerable activity against all tested bacteria (Figure 2).

FIGURE 2

The Antibacterial and antifungal activity of *Avena sativa* extract compared with Ampicillin and fluconazole



Sa= *Staphylococcus aureus, P= Proteus vulgaris, K=Klebsiella pneumonia, Ec=Escherichia coli , Pa= Pseudomonas aeruginosa, An= A. niger, Ca= Candida albican.*

3: Effect of ethanolic extract of *Avena sativa* in diabetes management:

50 mg/kg body wt. concentration of ethanolic extract of *Avena sativa* produces significant decrease in blood glucose level, after 1, 2, 4 and 8 hours of treatment as compared to untreated diabetic mice. After 4 and 8 hours of treatment, the percent of reduction in blood glucose level produced by *Arena sativa* (47±3.2), (44±2.3). After one week of treatment, blood glucose level in diabetic mice treated with *Arena sativa* decreases (20%) to below normal level. After tow week of treatment, blood glucose level decreases (35%) to below normal level. After three weeks of treatment, blood glucose level decreases (50%) to below normal level. Treatment of diabetic mice by *Avena sativa* extract resulted in significant decrease in serum triglycerides

TAG, total cholesterol TC and low density lipoprotein cholesterol LDL as compared to untreated diabetic.

IV. Conclusion

The ethanolic extract of *Avena sativa* showed good antibacterial activity against Gram positive ,Gram negative bacteria, *A. niger*, and *Candida albican*. Ethanolic extract showed very good activity as decrease in blood glucose level of diabetic mice.

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