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Antibacterial activity of some Algerian Medicinal plants

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ABSTRACT

Methanolic extracts and aqueous extracts of three Algerian plant species used in folk medicine were investigated for their antibacterial activities against four bacteria strains: Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, and Pseudomonas aeruginosa. The plants exhibited important antibacterial activity with a significant difference between the different plants. The most active plants were Rhetinolepis lonadioides Coss. Taraxacum officinnalis Of all extracts Methanolic of Rhetinolepis lonadioides Coss was the most active (diameter ranges between 15mm and 22mm) whereas, the aqueous and methenolic extracts of Taraxacum officinnalis gave convergent values. The tested Methanolic extract (Diameter ranges between 12 mm and 14mm) While diameter values ranged inhibition in aqueous extract of (08mm and 12mm)

Keywords: Antibacterial activity; methanolic extract; aqueous extract

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INTRODUCTION

Even though pharmacological industries have produced a number of new antibiotics in the last three decades, resistance to these drugs by microorganisms has increased. In general, bacteria have the genetic ability to transmit and acquire resistance to drugs, which are utilized as therapeutic agents [1]. Such a fact is cause for concern, because of the number of patients in hospitals who have suppressed immunity, and due to new bacterial strains, which are multi-resistant. Consequently, new infections can occur in hospitals resulting in high mortality.

The problem of microbial resistance is growing and the outlook for the use of antimicrobial drugs in the future is still uncertain. Therefore, actions must be taken to reduce this problem, for example, to control the use of antibiotic, develop research to better understand the genetic mechanisms of resistance, and to continue studies to develop new drugs, either synthetic or natural. The ultimate goal is to offer appropriate and efficient antimicrobial drugs to the patient.

For a long period of time, plants have been a valuable source of natural products for maintaining human health, especially in the last decade, with more intensive studies for natural therapies. According to World Health Organization [2] medicinal plants would be the best source to obtain a variety of drugs. About 80% of individuals from developed countries use traditional medicine, which has compounds derived from medicinal plants. Therefore, such plants should be investigated to better understand their properties, safety and efficiency [3].

The use of plant extracts and photochemical, both with known antimicrobial properties, can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency [4-10]. Many plants have been used because of their antimicrobial traits, which are due to compounds synthesized in the secondary metabolism of the plant. These products are known by their active substances, for example, the phenolic compounds, the essential oils [11] as well as in tannin [12].

MATERIALS AND METHODS

2.1. Plant collection

In the current work, three plant species commonly used in folk medicine in the south of Algerian. Mature plants were collected from site in Al-Golea southeast of Algeria during the spring and summer seasons before being dried in the shade and ground into a powdered material using an appropriate seed mill.

2.2. Extracts Preparation

2.2.1. Aqueous extracts

Each dry powdered plant (20 g) was infused in double distilled water until complete exhaustion .The extract was then filtered using Whatman filter paper, and the filtrate was evaporated in vacuum and dried at 60^{o}C using a rotary evaporator, recovered with distilled water and extracted with ethyl acetate .The residual water in the ethyl acetate was eliminated with anhydrous sodium sulphate, and then evaporated to dryness using a rotary evaporator. Dried extracts were dissolved in a small amount of DMSO and stored in the freezer [13].

2.2.2. Methanolic extracts

20 g of each dry powdered plant were macerated in Methanol (80:20, v/v) until complete exhaustion of the herb. The extracts were filtered using Whatman filter paper, and the filtrates were then evaporated and dried at 40°C using a rotary evaporator. Recovered with distilled water and extracted with ethyl acetate .The residual water in the ethyl acetate was eliminated with anhydrous sodium sulphate, and then evaporated to dryness using a rotary evaporator. Dried extracts were dissolved in a small amount of DMSO and stored in the freezer [13]

2.3. Antimicrobial activity

The methanol and Aqueous extracts of *Rhetinolepis lonadioides Coss.*

Taraxacum officinnalis , Silybum marianum were tested by the disc diffusion method [14]. Different concentration of the extracts (100 µg ml) was prepared by reconstituting with DMSO , against four pathogenic bacteria, including Gram positive, Gram-negative bacteria: *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella Pneumoniae, Pseudomonas aeruginosa*

The bacterial strains were first grown on Muller Hinton medium (MHI) at 37 ◦C for 24 h prior to seeding on to the nutrient agar. A sterile (5-mm-diameter filter disk (Whatman paper no 3) was placed on the infusion agar seeded with bacteria. The treated Petri disks were kept at 4 ◦C for 1 h, and incubated at 37 ◦C for 24 h **[15].**

The antibacterial activity was assessed by measuring the zone of growth inhibition surrounding the disks. Each experiment was carried out in triplicate.

RESULTS AND DISCUSSION

Table 1: Antibacterial activity of plant extracts against the bacteria strains

Inhibition zone Micro-organisms diameter (mm)								
Extract / Plants Species	*E. coli*		*P. aeruginosa*		*K. Pneumoniae*		*S. aureus*	
	W	M	W	M	W	M	W	M
Rhetinolepis lonadioides Coss	15	18	12	22	14.5	15	13.5	15
Taraxacum officinnalis	12	14	12	14	08	12	12	12
Silybum marianum	12	08	12	11	08	07	11	10

W: water extract, M: Methanol extract

Antibacterial activity of the extracts of three plants belonging to Asteraceae family has been evaluated in vitro against four bacterial species a known to cause dermal and mucosal infections, in addition to other infections (Table 1). All the studied plants showed Antibacterial activity. The most active plant extracts were *Rhetinolepis lonadioides Coss* while the least active ones were *Silybum marianum*

The most active plant studied in this work seem *Rhetinolepis lonadioides Coss.*

To possess similar Antibacterial active compounds including essential oils (especially thymol, β-Myrcene), flavanoids and triterpenes and other compounds of phenolic nature or with free hydroxyl group, which are classified as active antimicrobial compounds. However, some of the moderately active and least active plants were also reported to have similar and/or other active compounds but probably in smaller amounts.

The present work has shown that most of the studied plants are potentially a good source of Antibacterial agent and demonstrates the importance of such plants in medicine and in assisting primary health care in this part of the world.

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