

## Antibacterial activity of *Nerium oleander*

Samra A. Ahmed<sup>1</sup>, Hala H. Hammadi<sup>2</sup> and Buthainah M. Taha<sup>3</sup>

<sup>1,2</sup> Department of Pharmacognocny , College of Pharmacy , Al Mustnsiriya University.

<sup>3</sup> Department of Biology , College of Science , Al Mustnsiriya University.

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### الخلاصة

تهدف هذه الدراسة الى معرفة نشاط مستخلص جذور وأوراق نبات الدفلة المضاد للنشاط البكتيري خارج الجسم الحي لبكتريا القولون وبكتريا المكورات العنقودية والمكورات العنقودية الذهبية وبكتريا البروتيويس. حيث اظهرت المستخلصات الكحولية بتركيز ( 2.5, 5, 10, 20 ) ملغم/مل نشاطا مضادا للانواع البكتيرية مع مناطق تثبيط حيث اظهر المستخلص الايثانولي للدفلة بنفس التراكيز فعالية عالية ضد الانواع البكتيرية مع مناطق تثبيط تتراوح اقطارها ( 12- 25 ) ملم والمستخلص الميثانولي بين ( 10-22 ) ملم .

### ABSTRACT

The objective of this study is to investigate the antimicrobial activity of *Nerium oleander* roots and leaf extract against *Staphylococcus epidermis* , *Escherichia coli* , *Protus mirabilis* and *Staphylococcus aureus* . The ethanol and methanol extracts of *Nerium oleander* showed high activity against the bacteria with different range of inhibition zone . The ethanolic extract of *Nerium oleander* (2.5, 5, 10, 20) mg/ml showed high antibacterial activity against all tested micro-organisms with inhibition zone of (12 -25) mm , while methanolic extract of leaves with the same concentrations showed inhibition zone (10-22) mm.

### INTRODUCTION

*Nerium oleander* is an evergreen shrub or small tree in the dogbane family Apocynaceae, toxic in all its parts. It is the only species currently classified in the genus *Nerium*. It is most commonly known as oleander, from its superficial resemblance to the unrelated olive *Olea*, [1] [2] but has many other names, Oleander grows to 2–6 m (6.6–20 ft) tall [2] , with erect stems that splay outward as they mature; first-year stems have a glucose bloom, while mature stems have a grayish bark [3] . The leaves are in pairs or whorls of three , thick and leathery, dark-green, narrow lanceolate, 5–21 cm (2.0–8.3 in) long and 1–3.5 cm (0.39–1.4 in) broad, and with an entire margin [4] . The flowers grow in clusters at the end of each branch; they are white, pink to red ,2.5–5 cm (0.98–2.0 in) diameter, with a deeply 5-lobed fringed corolla round the central corolla tube. They are often, but not always, sweet-scented [5] .The fruit is a long narrow capsule 5–23 cm (2.0–9.1 in) long, which splits open at maturity to release numerous downy seeds-[6]

However, despite the common [poisonous](#) designation of this plant, very few toxic events in humans have been reported. According to the Toxic Exposure Surveillance System (TESS) in 2002 there were 847 human exposures to oleander reported to poison centers in the United States.[7]. In contrast to consumption of these undefined oleander derived materials, there is no toxicity or deaths reported from [topical administration](#) or contact with *Nerium oleander* or specific products

derived from them [8]. Today a large number of plants are used in the form of powder, decoction and infusion for the treatment of various diseases including the infection caused by microbes. [9]



## MATERIAL AND METHODS

### Plant material

The leaves and roots of *Nerium oleander* were collected in June 2012 from Baghdad, and identified in department of botany in Baghdad university.

### Extraction

The leaves and roots of *Nerium oleander* was collected and washed thoroughly in tap water followed by distilled water. The leaves shade dried at room temperature. Dried plants were uniformly grinded using mechanical grinder to make powder then five grams of grounded plant material was taken in Soxhlet apparatus with 150 ml of solvent of (methanol, ethanol) for 6hr then filtered and evaporated to obtained crude extract. [10]

### Culture media

The media used for bacteria was nutrient agar, and Mueller Hinton agar. The test organisms used included *Staphylococcus epidermis*, *Escherichia coli*, *Protus mirabilis* and *Staphylococcus aureus*.

### Antimicrobial activity

The extract obtained from leaves and roots were studied for antibacterial activity. The antibacterial study of ethanol and methanol extracts were assayed by using Holes Diffusion methods [11], holes of 16 mm diameter were made in the culture media of the tested bacterial isolates filled with (0.1) ml of extracts.

The plates containing the bacterial culture were incubated 37 °C for 24h, all the plates were examined for presence of zones inhibition as a property of antibacterial activity.

## RESULTS AND DISCUSSION

The extracts from 2 parts (root and leaves) of the plant were used in the present study to investigate their antimicrobial potential. Both gram-negative and gram-positive bacteria, the results of screening of antibacterial activity of *Nerium oleander* roots and leaves extract . The ethanolic extract of leaves of *Nerium oleander* showed higher antibacterial activity against all the tested micro-organisms ,with inhibition zone between ( 12 -25) mm , than methanolic extract of leaves with inhibition zone between (22-10 ) mm summarized in table 1.[12] [13][14]. .

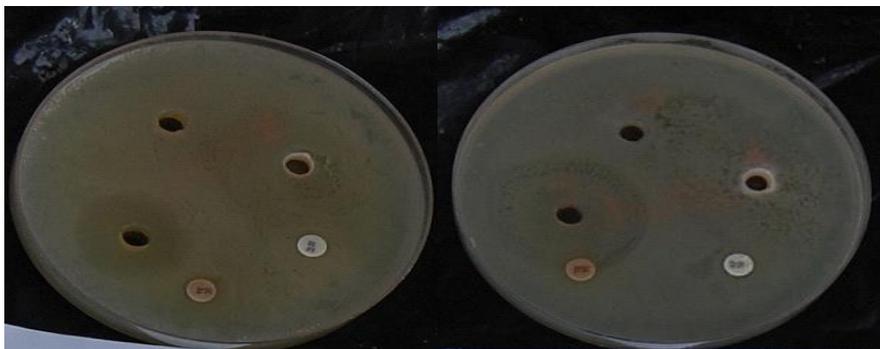
Table- 1: inhibition zone (mm) for ethanolic and methanolic extract of leaves

Bacteria	Extract of leaves	
	Ethanolic extract	Methanolic extract
<i>Staphylococcus aureus</i>	25 mm	22 mm
<i>Staphylococcus epidermis</i>	20 mm	20 mm
<i>Escherichia coli</i>	23 mm	22 mm
<i>Protus mirabilis</i>	12 mm	10 mm

The ethanolic and methanolic extract of roots of *Nerium oleander* showed high antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* .while it showed moderate activity against *Staphylococcus epidermis* table 2 ,similar finding in table 1.

Table -2: inhibition zone (mm) for Ethanolic and methanolic extract of roots

Bacteria	Extract of roots	
	Ethanolic extract	Methanolic extract
<i>Staphylococcus aureus</i>	24 mm	20 mm
<i>Staphylococcus epidermis</i>	20 mm	20 mm
<i>Escherichia coli</i>	23 mm	18 mm
<i>Protus mirabilis</i>	10 mm	8 mm



A

B

Figure -1 A: Inhibitions zone in *Staphylococcus epidermidis*

B: Inhibitions zone in *Staphylococcus aureus*

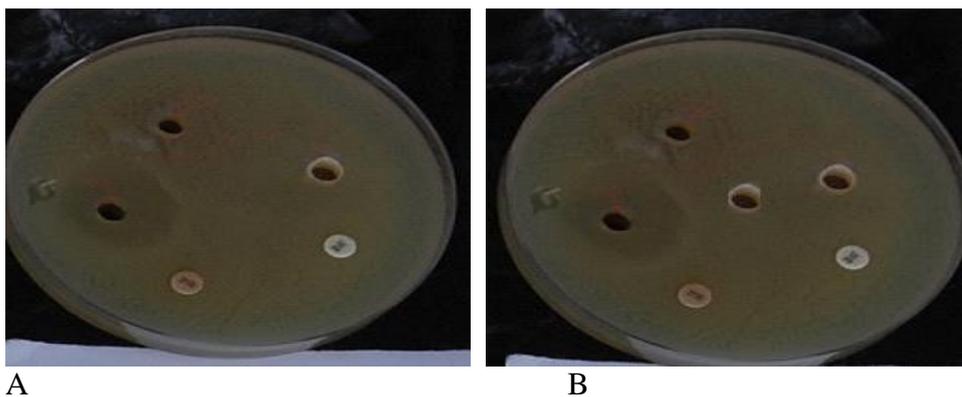


Figure -2: A: Inhibitions zone in *E coli* . B Inhibitions zone in *protus sp*

The presence of antibacterial substance in the higher plant is well established .The ethanolic and methanolic extract of leaves and roots show high activity against bacteria because presence active compound (oleandrin which is toxic cardiac glycoside, tocopherol ,ursolic acid) [12][15]

This compound act as anticancer, anti- inflammatory and antimicrobial activity <sup>[16]</sup> .The ethanolic extract reported the antimicrobial activity of leaves and roots of *Nerium oleander* against *Bacillus pumilus* , *B. subtilis* and *Aspergillus niger* [17]

Studied antibacterial activity of *Adhatoda vasica* ,*Calotropis procera* , *Nerium oleander* and *Ocimum sanctum* leaf on gram positive and gram negative bacteria[18]. Present study was conducted to investigated the antibacterial activity of *Nerium oleander* leaves and roots. The result obtained are encouraging as the methanolic, ethanolic extracts have shown considerable antimicrobial activity .The antibacterial activity of the plant is appreciable ,considering the importance of the microorganisms in infection further work is needed to isolate the active principle from the plant extract and to carry out pharmaceutical studies [19] . The potential of developing antimicrobials from higher plants appears rewarding as it will lead to the development of a phytomedicine to act against microbes. Today, our understanding of the interactions between drugs and herbs & food is still in its infancy. People are using herbal medicines from centuries for safety, efficacy, cultural acceptability and lesser side effects. Plant and plant products have utilized with varying success to cure and prevent diseases throughout history [20]. Major plunge by the pharmaceutical industry is focused towards design and development of new innovative/indigenous plant based drugs through investigation leads from traditional system of medicine . It is a best classical approach in the search of new molecules for management of various diseases. Though screening of literature is available on *Nerium oleander* depicted the fact that it is a popular

therapy among the various racial groups. Ayurvedic and traditional practitioners for treatment of ailments. Researchers have been exploring the curative potential of this plant as it has more therapeutic properties which are still not known .

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