# Antibacterial activity of Eruca Sativa Seeds Aqueous Extract Against Human Pathogenic Bacteria

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## Abstract

This research was achieved with the aim of detecting the Antibacterial efficacy of the watery extract Eruca of Sativa seeds toward human pathogenic bacteria, four Pathogenic species of bacteria(Enterococcus faecalis, staphylococcus aureus, pseudomonas aerogenoso, and Salmonella typhi) . were isolated from different clinical samples at al. Kademia teaching hospital Laboratory. **Results:** The results showed The extract inhibits gram positive bacteria and the mean inhibitory zone for strepto coccus faecalis and S. aureus was 10.4 mm and 14.0 mm respectively. **Conclusion**: The extract had no effect on gram negative bacteria.

***Keywords:*** *Eruca Sativa, seeds aqueous extract, pathogenic Bacteria*

## Introduction

*Eruca sativa* Miller ( synonym Eruca vesicaria Rocket) , usually called as Tarmira, Garden salad or Rocket salad or Jarjeer. *E. sativa* is one of the endemic species from the family of Brassicaceae which is cultivated in most cases in countries of Mediterranean sea like Greece, Turkey, and Italy. It is an annual dark-green plant, with height around 20-50 cm, with a taste of spicy pungent [(1)]. Its seed is commonly yellow, but sometimes is reddish yellow or spotted with brown-green spots [(2)].

The seeds have long been used in folk medicine as a lactagogue, aphrodisiac, diuretic, antis -corbutic, antimicrobial, to disintegrate renal calculi and induce vomiting

This used seeds were taken long time in traditional medicine as an aphrodisiac, diuretic, lacagog, anti-microbial, anti-bacterial, to induce vomiting and destroy kidney stones [(3)]. However, Flanders and Abdel-Karim [(4)] indicated that oil of seeds of Eruca sativa contains 93.8% fatty acids (11 ones) including 58.5% erucic acids, 6.7% saturated acids, 28.5 % linoleic acid, 1-2 % linolenic acid and 4.5% oleic acid. Depending to to EL-Gendy [(5)] , oil of Eruca sativa rises count of RBCs and the content of haemoglobin.

*S. aureus* is one of the Gram-positive bacteria, has a coccus shape and it is usually considered as a member of the microorganisms in the human body frequently. It is a member of the Firmicutes and it is exist on the human skin and in upper tracts of the respiratory system [(6)].

Usually, *Staphylococcus aureus* behaves the commensalism role, atypically colonizing approx. 30% of the population of humans. It can occasionallycause some diseases. Particularlly, it is mostly one of the common pathogens of infective endocarditisand bacteremia . In addition to, it can lead to different infections of soft tissues and skin , especially when mucosal barriers or the skin have been penetrated [(7)].

*Pseudomonas aeruginosa* have a common capsule, bacili-shaped, Gram-negative bacterium which can leads to occurrence some diseases in humans, animals, and plants. A species of great medical significance.

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*Pseudomonas aeruginosa* is an opportunistic pathogen in hospitals for individuals with immunodeficiency. It archetypically infects burns, urinary tract, the airway, wounds, and other infections of the blood.

This is the most frequent cause of the infection of external ear (otitis externa), injuries ,and burns, which is the most common colonizer of the medical devices such as catheters. *P. aeruginosa* can is spreading by the contaminated equipments and isn't carefully cleaned or by the hands of health care workers. It can rarely cause pneumonia acquired from the community [8].

*Salmonella typhi*, the Gram-negative bacterium also called as *S. enterica* serotype Typhi, which grow in blood and intestines . Typhoid fever or Typhoid is spreading by drinking water or consuming food contaminated with stool of the infected people.

Typhoid is an infectious bacterial disease caused by *S. typhi* which causes differential symptoms. Symptoms may vary from severe to moderate and always start 6-30 d after the exposure to this bacteria [9].

## Objective

This study was carried out with the aim of detecting the e Antibacterial efficacy of the watery extract of Eruca Sativa seeds toward some pathogenic bacteria to humans.

## Material and Method

**a. Bacterial isolates:**

Four Pathogenic species of bacteria were isolated from different clinical samples at al. Kademia teaching hospital Laboratory.

The isolates were Gram positive coca, Enterococcus faecalis and staphylococcus aureus (S. aureus). And Gram negative loacilli, pseudomonas aerogenoso, and Salmonella typhi.

Bacteria were isolated and diagnosed according to cultural, morphological and biochemical characters according to [10].

b. subculturing of bacterial isolates

From stock culture, Nutrient broth tubes were inoculated for each bacterial speciesseparately, and the tubes incubated at 37 ° C for 24 h.

d. susceptibility test:

The susceptibility of the seed aqueous extract was determined by disc diffusion method according to [11] ., 0.1 milliliters of each bacterial species containing approximately $17^7$ cfu / mL was transferred aseptically and spread on the surface of plates of MullerHinton agar (MH-agar).

Serile discs prepared from the filter paper (6 mm ) were impregnated with 20 micro liters of the extract, a standard antibiotic disc gentamicin 40 mg/ml has been used as a positive-control and a disc containing 20 micro liters of sterile distilled water as a negative-control. However, all the done discs have been placed on the surface of MH medium and then the dishes have been incubated at 37 ° C for 24 hr [10] .The test was done in triplicate for each bacterial species.

## Results

The average of inhibition Zone diameter was determined after the end of the incubation period.

The extract inhibits gram positive bacteria and the mean inhibition Zone for strepto coccus faecalis and S. aureus was 10.4 mm and 14.0 mm respectively.

The extract had no effect on gram negative bacteria, the results were shown in table 1.

**Table (1) Antibacterial efficacy (zone of inhibition) of seeds extract of E. sativa (mm)**

| Bacterial species | Aurce of isolate | E. sativa extract | Gentamicin positive control | Distilled water negative control |
|---|---|---|---|---|
| Enterococcus faecalis | Urine | 10.4 | 25:3 | - |
| Staphylococcus aureus | Wound | 14.0 | 22.0 | - |
| Pseudomonas aerogenosa | Burn | - | 15.8 | - |
| Salmouella typhi | Stool | - | 18.0 | - |

- : means no inhibition zone.

## Discussion

The increasing occurance of resistant bacteria could be due to overuse or misuse of commercially available antimicrobials in addition to side effect and toxicity of some of these antimicrobials, this made scientist try to develop aneffective, alternative, affordable, safer and nontoxic antimicrobials of plant origin.[11, 12] .

Eruca sative seed extract contains several secondary mrtabolites [ glucosinolate isothiocyanate, Alkaloids, and theic derivaties, Flavonoid, phenols, Tannins, and erucin which are responsible for their antioxidant and antibacterial activity.[13, 14].

Entero coccus Faecalis and s. Aurus was sensitive to the extract and this may be due to mesh like peptidogly can Layer in their cell wall[15].

While Pseudomonas aerogenosa and Salmonella typhi were resistaut to the extract due to the selective permeability of Lipopoly saccharide membrane to hydrophilic solutes which restrict the entry of the extract [16] . and the extraction method used and type of solvent may affect the result too. [17, 18].

The absence of antimicrobial activity of the extract does not indicale that the plant was inactive or not contain bioactive substances [19].

**Ethical Clearance:** The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

**Conflict of Interest:** The authors declare that they have no conflict of interest.

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