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EFFECT OF COLD AND HOT ALCOHOLIC EXTRACT OF CORIANDRUM SATIVUM L SEEDS AGAINST PSEUDOMONAS AERUGINOSA AND STAPHYLOCOCCUS AUREUS

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Abstract:

Coriandrum sativum L. (C. sativum) is one of the most important medicinal herbal extracts. Therefore, the current study included testing the inhibitory efficacy of hydroalcoholic and cold-hot alcoholic extracts of C. sativum L. seeds as an antimicrobial compared with ceftazidime (CAZ) against the growth of Pseudomonas aeruginosa and Staphylococcus aureus. The results showed that the cold alcoholic extract had antimicrobial activity against Pseudomonas aeruginosa such as ceftazidime, where the diameter of the inhibition zone reached 20 mm, while the hot aqueous extract did not show any antimicrobial effects. The mixture of cold alcoholic extract and ceftazidime was increased towards Pseudomonas aeruginosa and the inhibition zone was 29 mm in diameter. In conclusion, the alcoholic extract was shown to be the best and the efficacy of the extract also increased when combined with ceftazidime as an antimicrobial compared to the hot aqueous extract.

Keywords: *Coriandrum sativum* L., ceftazidime, *Pseudomonas aeruginosa, Staphylococcus aureus*

INTRODUCTION

The indiscriminate use of antibiotics led to the emergence of new strains of microbial isolates. We now need to discover new antimicrobial mechanisms of action that have broad spectrum efficacy and do not weaken the body's immunity. In fact, the ability of plants to synthesize compounds through simple metabolism lies in the seeds, leaves and roots, which are of medicinal importance as phenols and alkaloids. C. sativum boasts a high-quality list of nutritional components and health benefits. This herb consists of iron, magnesium, and vitamins A, B, and C. There are essential oils bound within the seeds of the herb. These include linoleic acid, ascorbic acid, palmitic acid, oleic acid, and stearic acid. This herb may be a rich source of fiber, minerals, and antibacterial chemicals including alpha-pinene, beta-phyllindrin, cineole, and borneol (1). The use of medicinal plants since the dawn of civilization in the treatment of many diseases, including flatulence and colic, strengthening the heart muscle, stomach pain, skin ulcers and wounds, and treating worms (2). C. sativum L. which belongs to the Albaceae (Umbelliferae). It is the brightest one in all healthy plants. Contains Avital Oil (0.03 to 2.6%) (3).
Coriander oil possesses broad antimicrobial activity (4). It contains vitamins, peptides, minerals, unsaturated fatty acids, antioxidants, and enzymes (5). Coriander seeds have antibacterial and antifungal properties as well as antioxidants (6). Coriander is often used as a natural detoxifier due to its ability to remove cyanogenic minerals from the body. Chemical compounds in cilantro bind to cyanogenic minerals and remove them from cells (7). This plant is very effective in removing the inorganic chemical mercury and methyl radical from polluted water. Coriander contains effective compounds that are easy to use for many purposes, including the pharmaceutical industry, perfumery and soap industry, as coriander seeds contain linalool and pinene (8), as well as limonene, coumarin, flavonoids, potassium, calcium, magnesium, iron and vitamins (9). The coriander plant is considered one of the anti-bacterial natural drugs that cause food poisoning, as the use of coriander extract limits the spread of contamination to some contaminated solutions, through the mechanism of destroying the bacterial cell membrane, which leads to the death of bacterial cells immediately (10).
Coriander is especially prescribed for patients with colon and duodenal cancer in preventing the growth of cancer cells (11). And it was used by researchers in the field of the environment in the discovery of environmentally safe alternatives to control pests (12).

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In other studies, the use of coriander extract in the control of Alsdiah Trogoderma granarium showed that the effect on the insect increased by 4.350% (13), because it is a natural decomposing product and is very effective. Against harmful insects and has no harmful effect on humans, animals and animals (14). And some studies have confirmed that Staphylococcus aureus is a major infectious agent due to morbidity and mortality in many hospitals around the world. It recorded an incidence rate of 10.0 per 1,000 hospital admissions. The mean incidence of Staphylococcus aureus infection throughout the study period was 1.8 per 1,000 patient-days, with annual rates ranging from 0.95 to 3.47 per 1,000 patient-days (15). The aim of this study was to compare the results of hot aqueous extract and cold alcoholic extract of C. sativum L. as antimicrobials against P. aeruginosa and Staphylococcus aureus.

MATERIALS & METHODS

1. Dry coriander seeds were purchased from local marketing - Baghdad and classified in the General Authority for Examination and Accreditation of Plant Genetic Resources Seeds - Alpinek Genes. It weighs 500 grams with a digital scale, then it is sterilized and placed in dry packages for safekeeping.
2. Two strains of bacteria were obtained that were diagnosed and examined in the laboratories of the Department of Life Sciences, College of Sciences, Al-Mustansiriya University, and they are Pseudomonas aeruginosa and Staphylococcus aureus. The antibiotic Ceftazidime (CAZ 32 µg / ml) was used as a control.
3. Plant seed extracts were prepared by grinding the seeds with an electric grinder and placed in clean, sterile glass containers. Prepare the hot aqueous extract by dissolving 50 grams of seed powder in 500 ml of boiled distilled water. Also, another 50 grams of seed powder were taken and soaked in 500 ml of cold 70% ethanol (to obtain an alcoholic extract), then the mixture was left in a shaking incubator at 37 °C for 24 hours and after filtering the extracts were poured into sterile Petri dishes and left In the electric oven at 60 degrees Celsius for one day until it dries, then it is collected in tubes until use. One gram of each extracted powder was dissolved individually in 10 mL of distilled water and then prepared at 1000 µg/mL of each at pH 5.
4. Well-diffusion of agar method was applied to determine antimicrobial activities. Nutrient agar (NA) plates were wiped with sterile (cotton swabs) 12-hour old broths cultured from the respective bacteria. 5 mm diameter wells were made in each plate using a sterile cork drill. A stock solution of each extract was prepared in distal water (DW) at concentration of 1 mg/ml in different plants extract. Approximately 100 µl of different concentrations of seed plant solvent extract were added using sterile syringe into the wells and allowed to infuse at room temperature for 2 h. All dishes were incubated at 37 °C for 24 h. The diameter of the (mm) inhibition zone was measured while the activity index also calculated for the inhibition area of hot aqueous extract (HAE), the inhibition zone of HAE mixed with ceftazidime (CAZ), the area of inhibition of cold alcoholic extracts (CAE) and the inhibition zone of CAE mixed with CAZ. Also, control experiments including On Vaccines With CAZ (12)

RESULTS& DISCUSSION

The results in this study showed that the highest inhibition zones appeared using CAE + CAZ extract 29 mm, while 20 mm were recorded for each of CAE, CAZ, HAE + CAZ. While 3mm inhibition zone was shown using HAE on the growth of Pseudomonas aeruginosa. and Staphylococcus aurous showed 100% resistance to CAZ and all extracts (Table 1 and Figure 1).

Through the study, it was found that the cold alcoholic extract had an antimicrobial effect against P. aeruginosa like ceftazidime, where the diameter of the inhibition zone reached 20 mm, while the hot water extract showed a slight antimicrobial effect. This was confirmed by the previous study in the sensitivity of P. aeruginosa bacteria towards plant extracts and antibiotics (13, 14). In the case of ceftazidime mixed with the cold alcoholic extract, the results showed that the activity of ceftazidime increased towards P. aeruginosa only as the diameter of the inhibition zone reached 29 mm. While the hot aqueous extract showed a very weak antimicrobial effect, these results are consistent with the previous study confirming that active compounds may be present but have little antimicrobial effect (16, 17, 18).

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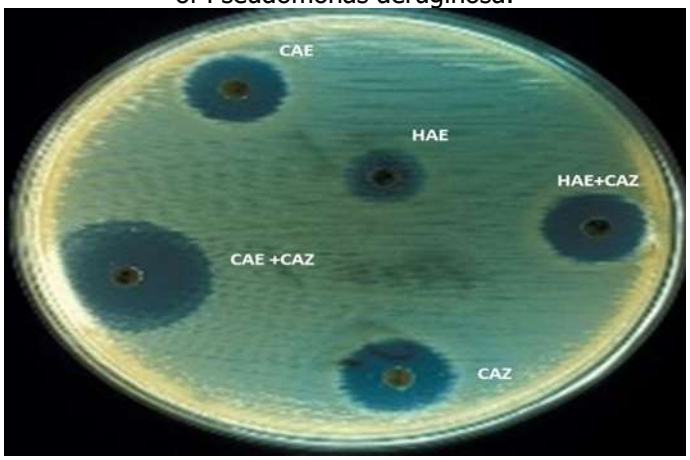
Table 1: The inhibition zones of HAE, HAE mixed with CAZ, CAE, CAE mixed with CAZ and CAZ on the growth of *Pseudomonas aeruginosa* and *Staphylococcus aureus*

Type of Bacteria	inhibition zone of CAZ	Inhibition zone of HAE	Inhibition zone of HAE+CAZ	Inhibition zone of CAE	Inhibition zone of CAE+CAZ
P. aeruginosa	20mm	3mm	20mm	20mm	29mm
Staphylococcus aurous	-	-	-	-	-

Figure 1: Shows the inhibition zones of HAE, HAE mixed with CAZ, CAE, CAE mixed with CAZ and CAZ on the growth of Pseudomonas aeruginosa.



HAE=(hot aqueous extract), CAZ=(ceftazidime), CAE=(cold alcoholic extracts)

The interpretation of the result of the above extracts is due to the fact that coriander seeds contain 44 compounds mainly of aromatic acids, including 2-decenoic acid, E-11-tetradecenoic acid, capric acid, undecyl alcohol, tridecanoic acid and undecanoic acid as main components, and the seed oil contains 53 compounds Where the main compounds are linalool, geranyl acetate and terpene (19). In addition, limonene and flavonoids have the ability to kill bacterial cells and inhibit their growth by damaging the bacterial membrane and cytoplasmic components and inhibiting enzymes (20, 21).

It is worth noting that ceftazidime is used to treat infections caused by Plasmodium aeruginosa, such as infection in the bile duct, bone and joint infections, respiratory infections, meningitis, urinary tract infections, blood poisoning, skin inflammation, especially burns, gangrene, and skin ulcers (22, 23). From the foregoing, we point out that there are several factors that affect the result of environmental factors for plant growth, the type of extract, the optimal method of drawing in ideal conditions, and the method of testing this extract (24). In conclusion, cold alcoholic extract was shown to be superior and to increase the antimicrobial efficacy of ceftazidime compared to hot aqueous extract.

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