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Antibiotic and chemical study for the petroselinum sativum L. that belong for Umbellifera family

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Abstract---Petroselinum sativum L: is plant belong to Umbellifera Family , The aim of this study identification phytochemical compounds by using Gas Chromatography Mass- Spectrometer and Percentage of volatile oils extracted and determined the effect oils extract on four of bacteria (Escherichia Coli , Pseudomonas putida and Enterococcus faecales) . P. sativum L. fresh from Karbalaa city. Iraq in 1/2/ 2022 during the flowering and volatile oils extract by soxhlet apparatus for about 20 hours , The results indicated the percentage of volatile oils for the P. sativum L. gave the height percentage of the volatile oils extract (5%), The Gc/mass analysis of the compounds in the extraction of P. sativum L. shown that essential oil 25 compounds and had the highest compound concentration Hexadecyn-1-ol reaching it is percentage (25.73%), followed -Isopropyl-2-methylphenyl carbanlate (18.45%) , Then 9-Octadecenoic acid, (E)- compound concentration (17.89%) . The antibacterial effected of oils depending were concentration increasing my due be the high concentration was supreme effective . highest effect was evident upon (E. faecals) with inhibition zone of 5.6 , 6.12 , 17.12 and 19.15 mm to 25 , 50 and 100 mg/ml concentration of oils respectively .Conversely 25 and 50 and 100 mg/ml concentration of volatile oil the lowest influence with 5.51, 6.15, 10.11 and 15.05 mm respectively inhibition zone of E.coli , However 25 and 50 and 100 mg/ml concentration of oils was efficacious again

P.putida with inhibition zone of 3.5 , 5.34 , 9.15 and 12.14mm respectively.

Keywords---petroselinum sativum, escherichia coli, pseudomonas putida, enterococcus faecalis.

Introduction

Medicinal plants (alternative plants) occupy a conscious place in the sciences of pharmacy and medicine at the present time, known as complementary medicine (1). Volatile oil: are essential oils metabolites that are produce used plants (2), *Petroselinum sativum* L. commonly names as parsley came in to being in the mediternaneam area of Europe, the roots is thick and thin, tuberous to fusiform, the leave are ovate and tripinnate (3). *P. sativum* L. (parsley) is belong to the Umbellifera family that has importment role in pharmaceutical, cosmetic industries, food and perfume (4). *P. sativum* L. used as food important medically role and has treatment of diseases a hypoglycemic, a diuretic, antispasmodic, carminativ, laxative , antimicrobial , uterine tonic and hypotensive (5 , 6) and anti- inflammatory , dysuria , intestinal colic myalgia , dysmenorrhea and flatulent dyspepsia (7) and clotting , anti- toxins and antioxidant (8)

P. sativum L. leaves are rich oils, vitamins, ascorbic acid, protein, myristicin, salt and sodium, (6) and contain active compounds coumarine, flavonoid, a piole (9, 10). The parsley plant is one of the important leafy green plants used in the food and medical fields. It has many activity compounds such as vitamins, folic acid and mineral salts (11). As well as being a source of volatile oils and many activity compounds, so the seeds, leaves and volatile oil are used in the fields of therapeutic, complementary and preventive medicine (11). Nosocomial infections are the infections which progress at the time of hospitalization and present during admission to the hospital or were not incubating (12). Bacteria isolation and description from suitable assayed materials with antimicrobial susceptibility testing is the criterion of laboratory diagnosis of Nosocomial infections (13). plant extracts showed promising antibacterial activity,lik herbs could profit as beneficial origin of novel antimicrobial agents (14). *E.Coli* is one of the bacteria that causes diarrhea may be it produces toxins (15). *Ps.Putida* are considered one of the bacteria that cause intestinal infections, wounds and burns (16).

Material and Method

Plant collection

P. sativum L. frsh from Karbala city. Iraq in 1/2/ 2022 during the flowering stage in Karbala/iraq. grinded by mechanical grinder and used directly. The plant were air dried at oven degree 40C° and powdered .

Soxhlet Extraction

100 gm of plant was placed in thimble and extracted with 150 ml of (80%) ether in flask round volume (500 ml) for 20 hours, Extract was evaporated at (45 C°)

using a rotary evaporation apparatus (17) The percentage is estimated using the law shown in equation No (1) (18)

$$\text{Yield (wt.\%)} = \frac{\text{Weight of Oil produced}}{\text{Weight of Seed powder used}} \times 100\%$$

Gas Chromatography/ Mass Spectrophotometer (GC/MS)

The component identification was achieved by the GC-MS analysis using shimadzu GC-MS analysis was done at Ibn Al-bitar institution /Ministry of Industry and Minerals/Baghdad.

Table 1
Instrument Conditions

Gas Chromatograph	Agelint (7820A) USA GC Mass Spectrometer
Analytical Column	Agelint HP-5ms Ultra lneit (30 m length x 250 µm diameter x 0.25 µm inside diameter
Injection volium	1µl
Pressure	11.933 psi
GC Inlet Line Temperature	250 ˚C
Auxheateres Temperature	310 ˚C
Carrier Gas	He 99.99%
Injector Temperature	250 ˚C
Scan Range	m/z 25-600
Injection Type	Splitless
Oven Program	Temperature
Ramp 1	60 ˚C hold to 3 min
Ramp 2	60 ˚C to 180 ˚C 7 ˚C/min
Ramp 3	180˚C to 280˚C 8 ˚C/min
Ramp 4	280˚C hold to 3 min

Studying the effect of different concentrations on the growth of some pathogenic bacteria
Conservation and development of bacterial strains

The bacterial strains used were preserved on Nutrient agar medium and by schematic method to obtain on single colony and cultured sterile dishes every 3-4 weeks to keep it from contamination and was grown at a temperature of (37) C for (24) hours, where it was kept in the refrigerator until use. Nutrient broth strains were grown and maintained for 24 hours in the incubator at a temperature of 37 C. Then it was kept in the refrigerator until use, and the cultivation was re-cultivated in Nutrient Broth every week (19).

Test the effectiveness of oils against bacteria:

The Agar - Well diffusion method was used, and to know the results, the diameter of the damping area was measured (19).

Results and Discussion

Umbelliferae family contains a wide volatile oil component, The results of the table (2) indicated the percentage of volatile oils for the *P. sativum* L. gave the height percentage of the volatile oils extract (5%).

Percentage of volatile oils extracted

Table 2
Percentage of volatile oils extracted using suxhlet method

oils extracted	Percentage of oils extracted
P. sativum L.	5/100g *100 = 5

The Gc/mass analysis of the compounds in the extraction of *P. sativum* L. showed table (3 and 4) and figure (1), The study has shown that essential oil of *P. sativum* L. 25 compounds and had the highest compound concentration Hexadecyn-1-ol reaching it is percentage (25.73%) followed -Isopropyl-2-methylphenyl carbanlate (18.45%) , Then 9-Octadecenoic acid, (E)- compound concentration (17.89%) .

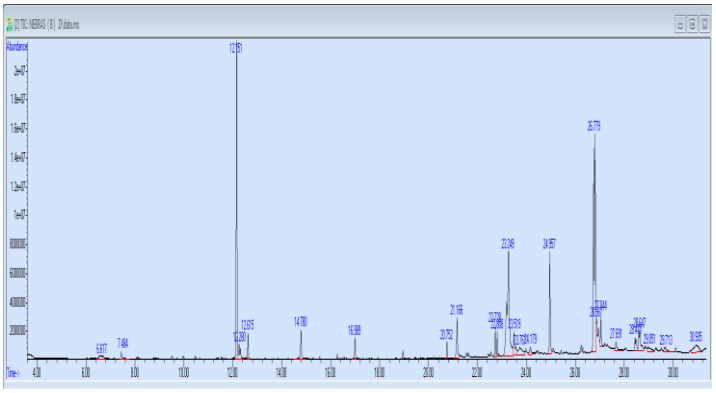

Figure 1. Components of Volatile Oil Extract of *P. sativum* Using GC/MS

Table 3
Components of Volatile Oil Extract of *P. sativum* Using GC/MS.

Peak	Retention time	Area%	Chemical Name
1	6.620	0.95	Cyclotetrasiloxane, octamethyl
2	7.487	0.74	p-Cymene
3	12.150	18.45	-5 Isopropyl-2-methylphenyl carbanlate

4	12.281	1.53	Thymol
5	12.613	1.05	-2,4 Decadienal
6	14.779	2.13	Cycloheptasiloxane, tetradecamethyl
7	16.990	1.12	Cyclooctasiloxane, hexadecamethyl
8	20.753	0.73	Tridecanoic acid, methyl ester
9	21.164	2.92	n-Hexadecanoic acid
10	22.729	1.48	-9,12 Octadecadienoic acid (Z,Z methyl ester ,-(
11	22.807	1.09	cis-13-Octadecenoic acid, methyl ester
12	23.251	17.89	-9 Octadecenoic acid, (E -(
13	23.518	2.46	Oleic Acid
14	23.759	2.36	-9,12Octadecadienoic acid (Z,Z -(
15	24.177	1.08	-9,12 Octadecadienoic acid (Z,Z -(
16	24.959	5.31	Palmitoyl chloride
17	26.779	25.73	-7Hexadecyn-1-ol
18	26.864	0.99	-15,16-1,2Diepoxyhexadecane
19	27.046	1.77	Diethylmalonic acid, monochloride octadecyl ester
20	27.692	0.94	cis-13,16-Docasadienoic acid
21	28.468	1.43	-7Trimethylsilyloxy-7-methyloctano ic acid, trimethylsilyl ester
22	28.644	3.22	-1) tert-Butoxypropan-2-yloxy)trime thylsilane
23	29.049	1.10	Ethyl iso-allocholate
24	29.714	1.00	1 H-Indene, 5-butyl-6-hexyloctahydro
25	30.934	2.53	-2 Methyl-Z,Z-3,13-octadecadienol

Table 4
Secondary metabolism Compounds Concentration by using GC/MS

Plant name	Area %	Chemical Compounds
P. sativum L.	25.73 18.45 17.89	7-Hexadecyn-1-ol 5-Isopropyl-2-methylphenyl carbanlate 9-Octadecenoic acid, (E)-

Table 5
Antibacterial activities of *P. sativum* L. oils at various concentrations by agar well diffusion method

Concentration	*E.coli*	*P.putida*	*E. faecales*
25 mg/ml	5.51	3.5	5.6
50 mg/ml	6.15	5.34	6.12
100 mg/ml	10.11	9.15	17.12
200 mg/ml	15.05	12.14	19.15

The search for alternatives to antimicrobial treatment has Multiple resistance of bacteria against most of the drugs used, as well as the side effects of these drugs (20). In table (5) demonstration the mm that created by concentrations of the oils inhibition zone , concentration oils extract 25, 50, 100 and 200 mg/ml manifested fine antibacterial effected , the 200 mg/ml concentration had more effect than 25 , 50 and 100 mg/ml . The antibacterial effected of oils depending were concentration increasing my due be the high concentration was supreme

effective . Table (5) indicate that the antibacterial effect of each oils concentration , the highesteffect was evident upon (*E. faecals*) with inhibition zone of 5.6 , 6.12 , 17.12 and 19.15 mm respectively to 25 and 50 and 100 mg/ml concentration of volatile oils .Conversely 25 , 50 and 100 mg/ml concentration of oils the lowest influence with 5.51, 6.15, 10.11 and 15.05 mm respectively inhibition zone of *E.coli* , However 25 , 50 and 100 mg/ml concentration of oils was efficacious again *P.putida* with inhibition zone of 3.5 , 5.34 , 9.15 and 12.14mm respectively.(21) The results showed that there is a difference in the effectiveness of the volatile oil against positive and negative bacteria , it was towards *E.Coli*, where the inhibition rate was (14 mm).

And it has been proven that the volatile oils have an effect on bacteria because they inhibit bacterial cells from the assembly of DNA and RNA components (22). (23,24) indicate that the antibacterial effect the aqueous extract concentration, the highest effect was evident upon (*E. faecals*) with inhibition zone of 9 , 11 , 14 and 17 mm respectively to 50 100 ,150 and 200mg/ml concentration of oils. Results (25,26) indicated that some bacteria did not inhibit by chemical components of the hot water extract, such as *E.coli* and *Klebsiella* while other genus of bacteria were less resistant compared to cold water extract of *petroselium*. Some studies indicate that the reason for the growth of these bacteria because to the structure of cells membrane that prevents other molecules from penetration and the presence of enzymes in this cells structure (27,28). Results (25) indicated that *E.coli* had less growth in cold water extracts after 24 hrs of incubation, which means this bacterium in the first time has sensitivity to components of the cold water extract than the components of hot water extract (29) study showed that Parsley juice extract had effect on both gram negative and gram positive bacteria isolated from patients suffering from urinary tract infection. *Staph. aureus* isolates showed inhibition zone varied from 8-13 mm in diameter.

References

1. Abid Ameen. M.M, Abbass.J.A.(2017). The role of bacterical inoculation, spraying with Humus and Magnesium sulfate fertilization on leaves growth and quality of Parsley Petroselinum crispum Var. Vulgare and its oxalic acid content. Alkufa journal of agriculture science . 9(3):1:41.
2. Afest , J.E.,K. Bergh , and L. Bevange. (2003) . High prevalence of a typical Entero Pathogenic E.coli (EPEC) in Nerwegian Children with diarrhoea . J.Med , 52, 1015 – 1019.
3. Ahmed, I. and A. Beg. (2001) .Antimicrobial and phytochemical studies on 45 Indian medicinal plants aginst multidrug resistant human pathogens .J. Ethnopharm ., 74: 113 – 123.
4. Al-Kareemi.k.k. (2012).Inhibitory Effect of Parsley (Petroselinum Crispum) Juice Against Some Urinary Pathogens in Vitro .. INHIBITORY EFFECT OF PARSLEY IN URINARY. VOL.11, NO.3,
5. Almjalawi B. Sh A, Alhamed T.A, Alhesnawi A.Sh M. (2022). Antibacterial Activity of *Boswellia carterii* Aqueous Extract and Its Effect on Phagocytosis in vitro. Archives of Razi Institute. Apr 1;77(2):545-52.
6. Almjalawi BSA, Al-Awade HAR, Al-Mafragy HS, AL Masaoodi NN. (2022). Antibacterial Activity of *Capsicum annum L.* Juice Against *Klebsiella*

pneumonia Isolated from Respiratory Tract Infections. Iranian Journal of War and Public Health.;14(2):139-146.
7. Almjalawi BSA, Alhamed TA, Almutteari AA. (2022). Antibacterial activity of biosurfactant extracted from *Streptococcus thermophilus* and its effect on some biochemical parameters in male rats. Caspian J Environ Sci.;20(1):131-6.
8. AL-Salhey. S.H. (2010). Idendification of some secondary metabolic compounds in ocimium (*Ocimum basilicum* L.) and study the effect of its volatile oil in some pathogenic bacteria .
9. ALwash.B.M; Salman.Z.O. (2016). Extraction of Iraqi Jasminum sambac L. Oil and Study It's Effect as Antioxidant Agents. 14(3). Journal of Baghdad..
10. Barnes J, Anderson LA and Phillipson JD (ed.). (2007) Herbal Medicines. 3rd ed. Pharmaceutical Press: An imprint of RPS Publishing, London.; pp: 456-458.
11. Bereket W, Hemalatha K, Getenet B, Wondwossen T, Solomon A, Zeynudin A, Kannan S. (2012). Update on Bacterial Nosocomial Infections. Eur Rev Med Pharmacol Sci.; 16 (8): 1039-1044.
12. Bhatia R and Ichhpujani RL. (2008) Essentials of Medical Microbiology. 4th ed. Jaypee Brothers Medical Publishers, New Delhi.; pp: 448-451.
13. Blumenthal, M (Ed.): (1998).The Complete German Commission E Monographs: Therapeutic Guide to Herbal Medicines. American Botanical Council. Austin,TX....
14. Chahal KK, Monika, A Kumar, U Bhardwaj and R Kaur (.2017). Chemistry and biological activities of *Anethum graveolens* L. (dill) essential oil: A review. Journal of Pharmacognosy and Phytochemistry 2017; 6(2): 295-306.
15. Fejes, S.; Krey, A. and Blazovics, A. (1998)."Investigation of the *in vitro* antioxidant effect of *Petroselinumcrispum* (Mill.) Nym.ex. A.W. Hill"; Acta. Pharm. Hung., 68, 150-156,
16. Galletto, R., Siqueira, V. L., Ferreira, E. B., Oliveira, A. J., & Bazotti, R. B. (2004). Absence of antidiabetic and hypolipidemic effect of *Gymnemasylvestre* in non diabetic and alloxan diabetic rats *Brazilian Archives of Biology and Technology*, 47(3), 545-551.
17. Gao, Y.; Van Belkum, M. J. and Stiles, M. E. (1999) "The outer membrane of Gramnegative bacteria inhibits antibacterial activity of brochocin-C"; Applied and Environmental Microbiology, 65, 4329–4333,.
18. Gruenwald J, Brendler T and Jaenike T. (2000).Physician Desk Reference for Herbal Medicines. 2nd ed. Medical Economics Company, Inc. at Montvale.; pp: 567-570.
19. Iqbal ,S. ; Younas, U.; Chan, K. Ul-Haq , M. and Ismail, M. (2012). Chemical composition of Artemisia annua L. leaves and antioxidant potential of extracts as a function of extraction solvents. Molecules. Vol.17:6020-6032pp.
20. Lopez M.G., I.R.Sancheze-Medozam and N.Ochoa-Alejo.(1999). Comparative study of volatile components and fatty acids of plants and in vitro cultures of parsley (Petroselinum crispum) (Mill) nymex hill). J. Agri. Food Chem, 47: 3292-3296.
21. Mohammad. M. H. (2014). Study the Effect of Cold and Hot Water Extracts of Parsley Plant Petroselinumcrispum on the Growth of some Enterobacteriaceae.. Journal of Al-Nahrain University science . Vol.17 (1).
22. Murray ,B.E. (1991). New aspects of antimicrobial resistance and the resulting dilemmas J.Infect. Dis. 163:1184-1194.

23. Myrvick, N. and S.Weiser. (1988). Fundamentals of Medical Bacteriology and Mycology 2nd ed. Lea and Febiger. Philadephia.
24. Ozsoy-Sacan O., R.Yanardag, H.Orak, Y.Ozgey, A.Yarat and T.Tunali. (2006). Effects of parsley (Petroselinum crispum) extract versus glibornuride on the liver of streptozotocin-induced diabetic rats. J. Ethnopharmcol,104(1-2): 175-181.
25. Parmin, P., Suarayasa, K., & Wandira, B. A. (2020). Relationship between quality of service with patient loyality at general polyclinic of kamonji public health center. International Journal of Health & Medical Sciences, 3(1), 86-91. https://doi.org/10.31295/ijhms.v3n1.157
26. Perez,C., Pauli,M.Bazerque,P. (1990).Antibiotic assay by the agar-Well diffusion method .J.Actabiogiae. , 15:113-115.
27. Russo, A.; Izzo, A. A.; Borrelli, F.; Renis, M. and Vanella, A. (2003) Free radical scavenging capacity and protective effect of BacopamonnieraL. on DNA damage"; phytother Res., 17, 870,.
28. Saranraj P. and Sivasakthi S. (2014) Medicinal Plants and its Antimicrobial Properties: A Review. Global J Pharmacol.; 8 (3): 316-327.
29. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, *6*(1), i-v. https://doi.org/10.53730/ijhs.v6n1.5949
30. Yanardag, R.; Bolkent, S.; Tabakoglu-Oguz, A. and Ozsoy-Sacan, O. (2003) "Effects of *Petroselinumcrispum*extracts on pancreatic B-cells and blood glucose of streptozotocin-induced diabetic rats"*;* Biol. Pharm. Bull., 26, 1206,.
31. Zeynal.A.A. (2017). Effect of Aqueous and Ethanolic Extract of Aerial Parts of Parsley (*Petroselinum crispum*) on Some Bacteria Isolated from Nosocomial Infections *in-Vitro*.. Diyala journal of pure science: Vol: 13 No:3..