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| RESEARCH ARTICLE

Similarity of Chemical Composition in Aqueous Extract of Rosemary and Olive leaves: An Analytical Study

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| ABSTRACT
In this study, the aqueous extract of rosemary and olive leaves was prepared, after which samples of the prepared extracts were sent to the food laboratories of Agriculture College, Basra University, Iraq, to perform the analysis process using GCMS technology to know the chemical compounds of the extracts. Where it was observed that there are 11 common chemical compounds among the two extracts, some are (exo-2-Hydroxycineole), (2,5-Dimethoxy-4-ethylamphetamine), (Epiglobulol), (Tridecanoic acid), ((-)-Spathulenol) , (Hexadecanoic acid, methyl ester) , (n-Hexadecanoic acid) , (cis-Vaccenic acid) , (Octadecanoic acid).

| KEYWORDS

Olive , Olea europaea , Rosemary , Rosemarinus officinalis L , GC-MS, extracts

| ARTICLE INFORMATION

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1. Introduction

The use of herbs as medicine plays an important role in almost all cultures, and on the level of the continents of the world, whether Asia, Africa, Europe or North and South America[1].The hypothesis on which herbal medicine depends is that plants contain natural substances that have the ability to promote health and reduce diseases. Many herbs help lower cholesterol as well as lower blood sugar, and some provide protection from cancer and activate the immune system[2]

Rosemarinus officinalis L. belonging to family Labiatae , it's an evergreen perennial aromatic shrub, native to the coasts of the Mediterranean Sea[3].Also, rosemary extracts contain many bioactive chemical components and The biological effects of rosemary depend mainly on the components of the essential oil of this plant [4,5,6]

Rosemary contains antiviral, antibacterial, antifungal, anti-inflammatory, anti-pain, anticoagulant, antidepressant, and antioxidant substances [7]

Beneficial effects, including antineoplastic, antioxidant, anti-infective, and analgesic activities. They also have effects on the endocrine and CNS and can help with a range of disorders such as post MI - cardiac remodeling, hyperlipidemic disorders, cerebral ischemia, liver toxicity, and stress, among others. [8]

Olive leaves(*Olea europaea*)are the by-product of olive groves and constitute approximately 25 kg of olive tree, where the term (olive leaf) refers to a mixture of leaves and branches that are produced when olive trees are pruned [9].The biochemicals contained in the olive tree are: secoridoids, carbohydrates, sugar alcohols, and terpenoids [10]

The main component of the secoridoid family in olive leaves is oleuropein. Oleuropein and the amount of this compound in young olives is very high, and it is metabolized to hydroxy aerosol during ripening, so its quantity decreases [11]

In addition, many studies have investigated the chemical composition of olive leaves in the presence of a large number of phenolic compounds such as hydroxy aerosol, oleuropein, rutin, verbascoside, luteolin-7-glucoside, ligustroside and oleuropein aglycone, in addition to other compounds such as quinic acid[12]

Since ancient times, olive leaves have been used in the treatment of fever and many other diseases such as malaria, and olive leaf extract has been used in the preparation of many pharmaceutical and cosmetic preparations and the food industry, both in terms of improving taste or as antioxidants, where the olive tree is one of the most important natural sources of antioxidants. Oxidation on a large scale, whether in terms of oil, fruit or leaves [13,14,15]

2. Materials and methods

2.1-Materials preparation

Rosemary and olive leaves were gathered and thoroughly rinsed using tap water and later distilled water . Then, they were laid out on ventilated plastic trays and left in the natural summer weather. After they were fully dried, they were powdered using an electric mill in preparation for making the extract.

2:2-Extraction method :

The process involved mixing 15 grams of powdered leaves with (300 mL) of d.w. using an electric mixer for (5 min.). The mixture was then stirred by using a magnetic stirrer for 1 hour and left to macerate for (24 hours). After the maceration, the mixture was filtered using layers of gauze. Finally, centrifugation was performed at a speed of 3000 revolutions per minute for 10 minutes. [16].

Figure 1: 1:olive extract, 2: rosemary extract

2.3. Analytical GC-MAS

Samples were tested using GCMS technology in the Agriculture College, University of Basra / Iraq

3-Results

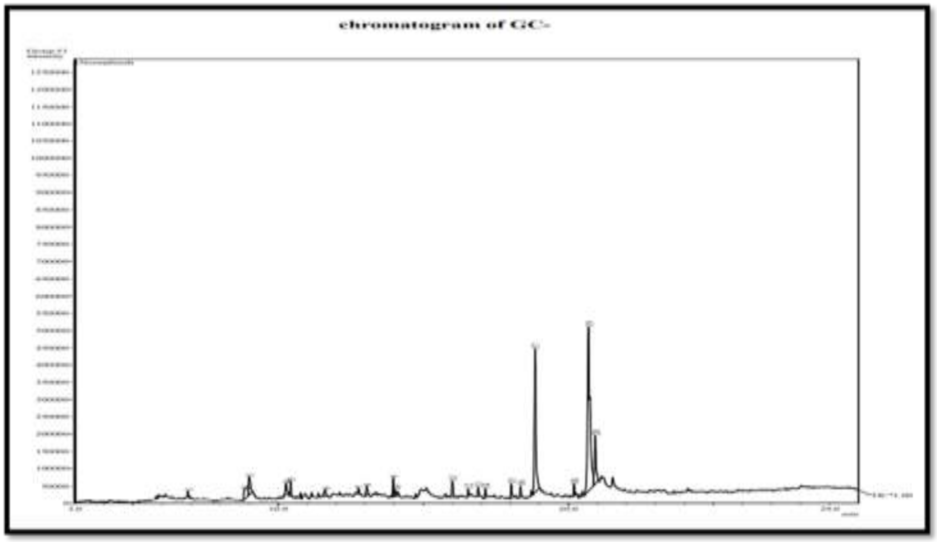

Figure 2: Chromatogram of GC for rosemary aqueous extract

Table 1: Chemical Compounds in rosemary extraction

No.	Peak	R.Time	Area%	Nuon
1	4	10.272	1.99	-2Methoxy-4-vinylphenol
2	5	10.436	1.49	exo-2-Hydroxycineole
3	6	11.621	1.25	Octadecanoic acid, 2-propenyl ester
4	8	13.056	1.21	Oxirane, hexadecyl-
5	9	13.967	1.86	-2,5Dimethoxy-4-ethylamphetamine
6	10	14.044	0.68	Dodecanoic acid
7	11	16.003	2.43	Epiglobulol
8	12	16.544	0.83	Tridecanoic acid
9	13	16.889	1.05	-2,6,8Trimethylbicyclo[4.2.0]oct-2-ene-1,8-diol
10	14	17.139	0.92	-(-)Spathulenol
11	15	18.031	1.87	-2Butenal-2 ,methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl-(
12	16	18.352	1.31	Hexadecanoic acid, methyl ester
13	17	18.857	22.72	n-Hexadecanoic acid
14	18	20.195	1.26	cis-13-Octadecenoic acid, methyl ester
15	19	20.695	42.57	cis-Vaccenic acid
16	20	20.924	7.55	Octadecanoic acid

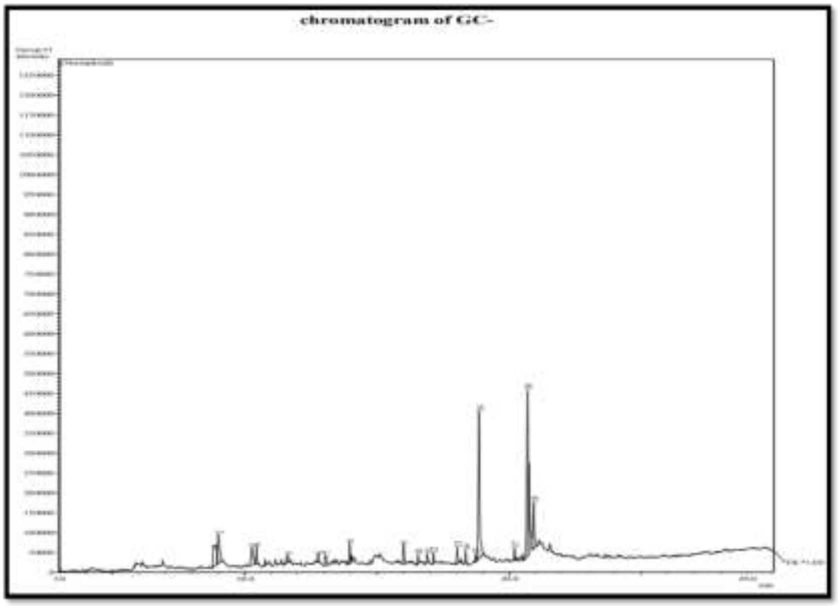

Figure 3: Chromatogram of GC for olive leaves aqueous extract

Table 2: Chemical Compounds in olive leaves aqueous extract

No.	Peak	R.Time	Area%	Name
1	3	10.275	4.32	4-Hydroxy-6-methylpyrazolo[3,4-d]pyrimidine
2	4	10.439	1.93	exo-2-Hydroxycineole
3	5	11.625	1.27	4,4-Dimethyl-cyclohex-2-en-1-ol
4	6	12.772	0.94	7-Hexadecenal, (Z)-
5	7	13.054	2.07	1,3-Di(cyclohexyl)but-1-ene
6	8	13.969	2.19	2,5-Dimethoxy-4-ethylamphetamine
7	9	16.003	2.92	Diepicedrene-1-oxide
8	10	16.545	1.15	Tridecanoic acid
9	11	16.896	1.18	2,6,8-Trimethylbicyclo[4.2.0]oct-2-ene-1,8-diol
10	12	17.138	1.15	(-)-Spathulenol
11	13	18.031	2.00	2-Butenal, 2-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-
12	14	18.353	1.40	Hexadecanoic acid, methyl ester
13	15	18.726	0.70	Epiglobulol
14	16	18.853	23.92	n-Hexadecanoic acid
15	17	20.194	1.33	9-Octadecenoic acid (Z)-, methyl ester
16	18	20.690	28.96	cis-Vaccenic acid
17	19	20.921	7.06	Octadecanoic acid

Table3: common chemical compounds between olive leaves aqueous extract and rosemary aqueous extract:

No.	Name	Formula
1	exo-2-Hydroxycineole	$C_{10}H_{18}O_2$
2	2,5-Dimethoxy-4-ethylamphetamine	$C_{13}H_{21}NO_2$
3	Epiglobulol	$C_{15}H_{26}O$
4	Tridecanoic acid	$C_{13}H_{26}O_2$

5	2,6,8-Trimethylbicyclo[4.2.0]oct-2-ene-1,8-diol	C11H18O2
6	(-)-Spathulenol	C15H24O
7	2-Butenal, 2-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-	C14H22O
8	Hexadecanoic acid, methyl ester	C17H34O2
9	n-Hexadecanoic acid	C16H32O2
10	cis-Vaccenic acid	C18H34O2
11	Octadecanoic acid	C18H36O2

4-Discussion

When conducting a GC-MAS analysis of the aqueous extract of olive leaves , rosemary leaves to know the chemical components of both extracts, it was noted that there are 11 chemical compounds (shown in the table) that are common between them Most of these compounds are highly biologically active, some of which are used in medicine and pharmacology and others in nutrition, agriculture, industry, or others.

n-hexadecanoic acid, methyl ester functions as Antibacterial , Antifungal , pesticide, anti androgenic flavor, hemolytic, 5-Alpha reductase inhibitor, Antioxidant ,octadecanoic acid Antimicrobial activity , hypocholesterolemic nematicide [17,18,19,20,21].

tridecanoic acid a natural substance, in various organisms including Rhododendron mucronulatum and Erucaria microcarpa [22], Its effectiveness has been proven as antimicrobial activity, antifungal activity.[23]

The researchers gave normal male participants varying amounts of2,5-dimethoxy-4-methyl amphetamine (DOET), a substance similar in structure to mescaline and amphetamine. They then compared the effects of DOET with a placebo. The results showed that DOET produced subjective effects such as mild euphoria, increased self-awareness, and higher levels of anxiety, especially at higher doses. However, there were no significant differences in these effects at the higher doses. No hallucinatory or psychotic effects were observed at any dosage, indicating that DOET's ability to enhance awareness does not lead to hallucinations or psychotic behaviors, even at different doses[24,25]

spathulenol, is possessing a 5,10-cycloaromadendrane structure, demonstrates significant bioactivity including anticholinesterase properties as well as anti-nociceptive and anti-hyperalgesic effects [26,27], Spathulenol, has been proven to have bactericidal effects on both drug-resistant and susceptible strains of M. tuberculosis, was also found to exhibit cytotoxic activity on the Vero cell line. The concentration required to cause cytotoxicity (CC50) was measured at 95.7 g/ml. These findings suggest that spathulenol may be an effective and selective anti-M. tuberculosis compound, especially against drug-resistant clinical isolates, as evidenced by its significant selective index of 15.31.[28]

Vaccenic acid (VA), also known as octadecenoic acid, is a version of oleic acid that differs in its positioning and geometric arrangement. It is the most commonly found trans monoene in ruminant fats and comprises approximately 50% to 80% of the total trans content. [29]

n-Hexadecanoic acid It is used in the treatment of rheumatic diseases and has anti-inflammatory activity. [31]

Epiglobulol Antimicrobial activity,Antiviral, Cytotoxic.[32,33,34]

5. Conclusion

The presence of 11 chemical compounds between the aqueous extract of rosemary and of olive leaves aqueous extract may indicate a great similarity in the chemical composition of the basic structure of both plants. In this study, these chemical compounds were identified and arranged in a table according to what was shown by the GC-MS technology and these common chemical compounds It has different biological activity from one compound to another in addition to being used in many different industries.

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