УДК 579.68

Гали К.

Студент магистерской подготовки

3- года, факультет «естественных наук»

Кафедра «Микробиологии»

Университет Аль-Басс

Сирия, г. Хомс

Аль-омар А. доктор биологических наук, профессор

профессор кафедры «Микробиологии»

Университет Аль-Басс

Сирия, г. Хомс

Мирза С. кандидат химических наук, доцент

доцент кафедры «Органическая химия»

Университет Аль-Басс

Сирия, г. Хомс

Кеши М.

Студент аспирантской подготовки 3- года, факультет «естественных наук» Кафедра «Органическая химия» Университет Аль-Басс Сирия, г. Хомс

ANTIBACTERIAL ACTIVITY OF ESSENTIAL OIL EXTRACTED FROM MATRIACIRA CHAMOMILLA

Annotation: *In this research the antibacterial activity of the essential oil extracted from pharmacy chamomile was determined.*

Key Words: *hydrodistillation, Clavenger, essential oil, GC-MS, antimicrobial activity, staphylococcus aureus.*

АНТИБАКТЕРИАЛЬНАЯ АКТИВНОСТЬ ЭФИРНОГО МАСЛА, ИЗВЛЕЧЕННОГО ИЗ МАТРИАЦИРЫ ХАМОМИЛЛЫ

Аннотация: *В статье был проведен анализ антибактериальной активности эфирного масла, извлеченного из аптечной ромашки.*

Ключевые слова: *гидродистилляция, клевенджер, эфирное масло, GC-MS, антимикробная активность, золотистый стафилококк.*

1.Introduction:

The Asteraceae or compositae is a very large family, with 1,911 genus distributed over 32,913 species [1,c.262]. Several genera of Asteraceae are very important, such Matricaria chamomilla, Xeranthemum, Chrysanthellum, , Echinacea in traitement of various daisies, and they are a source of antibacterial compounds [2,c.61]. Matricaria is a wide spread genus of plants of the family Asteraceae growing in temperate regions of world, it is very important to obtain to obtain its essential oil , as herbal tea, and for pharmaceutical or cosmetic properties.The chamomile essential oil is extensively served in food, cosmetics,and pharmaceutical industries It is a popular treatment for numerous ailments, including sleep disorders ,anxiety, digestion, intestinal conditions, skin infections/ inflammation (including eczema), wound healing, increase of Chamazulene and -Bisabolol Contents of the Essential Oil of German Chamomile (Matricariachamomilla L.) Using Salicylic Acid Treatments under Normal and Heat Stress Conditions [3,c.52].

The dried flowers are used as herbal infusions, fluid extracts and tinctures in human traditional medicine. It can be combinated with other herbal extracts or tinctures for treatment of skin lesions, eczema and inflammations. The flowers traditionally is taken as an anodyne, anti-inflammatory, antiseptic, antispasmodic, and carminative. An infusion is particularly useful as stomachic, nervine and sedative for young children, especially when they are teething. It is rich in volatile terpenoids and sesquiterpene lactones such as matricin, and phenolic compounds,

for these reasons it is one of the richest sources of dietary antioxidants , the high percentage o phenolic compounds will be a sources of naturally occurring antioxidants. and exhibit some antimicrobial properties[4,c.760],[5,c.820]. The volatile composition and yield depends on the part of plant and season of harvest and the methods of extraction. In this peaper, the antibacterial activity of the essential oil on some bacteria isolated from different areas of pimples with moderate and severe infection from patients with acne have been studied.

2. Taxonomic description of matriacira chamomilla:

matriacira chamomilla is a glabrous aromatic annual 10–40 cm, stem simple or branched at base, erect or ascending. Leaves pinnatisect into mucronate segments. Head radiate, 1.5–2 cm in diameter. Ray florets reflexed soon after beginning of flowering. Achene minute about 1 mm. and it is Flowering in April– and May [6,c.128].

3. Materials and Methods:

This is a pilot study of qualitative laboratory type, developed in the Laboratory of Microbiology of a albaath college located in Hims city.

3.1 Plant Material:

Aerial parts of Matricaria chamomilla, were collected and dried in March 2017, from -West of Hims, Syria. The plant was authenticated by the Atomic Agent in Syria. A voucher specimen of plant was deposited in the laboratory of chemistry of natural products, Department of chemistry, Laboratory of Microbiology, Faculty of sciences, AL Baath University, Hims, Syria.

3.2. Essential oils analysis

The analysis of the essential oil was performed with Shimadzu Bruker Ultra Shield gas chromatograph with a capillary column DB5 (30m × 0.25 μm) With an internal character (0.25μm). Temperature program was as follows: 3 min at 40°C, increased to 100°C at a rate of 5°C min, then, increased to 120°C at a rate of 5°C min and held at that temperature for 1 min, increased to 180°C at a rate of

6°C min, increased to 200°C at a rate of 20°C min, increased to 220°C at a rate of 30°C min, then increased to 280°C at a rate of 40°C min and held at that temperature for 1 min. Injection temperature was 230°C. Injection volume was 1.0 μL. Helium was used as a carrier gas (1 mL/min). the The identification of the constituents was performed by comparing the spectra obtained with database of Wiley Spectral Library Collection and NSIT library database. Quantitative data were obtained from the electronic integration of the FID peak areas.

3.3. Extraction the essential oil:

The extraction of essential oil was carried out by hydro-distillation using Clavenger type apparatus. 200 gr of matriacira chamomilla was boiled in water during 4 hours and the yield of essential oil was 1.77% (w/w). The essential oils obtained has blue color with characteristic odor. The oils were stored in a refrigerator until the analysis by GC-MS

3.4. Procedure Organization:

The microorganisms used in the study were selected for representing frequent agents in the occurrence of infections related to healthcare is Staphylococus aureus acquired from the biotechnology Lab.

The chamomilla oil was extracted as follows: the plant was collected in Homs in March 2017. The leaves and seeds were washed with clean water, exposed to dry air and subsequently placed in a Clevenger apparatus for obtaining oil by steam distillation technique, and the hydro distillation method. The extracted Matricaria chamomilla essential oil remained in a labeled sterile bottle. The microorganisms were plated by platinum loop into labeled vials containing five milliliters (ml) of sterile nutrient broth and incubated at 36°C for 24 hours. After this period, each microorganism was seeded in two identified and sterile Petri dishes containing nutrient agar. The microorganisms were distributed with sterile swabs by the rolling technique in all the culture medium. Sterile filter paper discs with one centimeter (cm) diameter were soaked in the different

concentration of essential oil with the aid of sterile forceps until complete absorption of the products used in the experiment and distributed in the culture media, properly identified and numbered. All plates were placed in a bacteriological incubator at 36°C for 24h. After this time, the reading of the result was carried out with the naked eye and the inhibition zone was measured with a ruler.

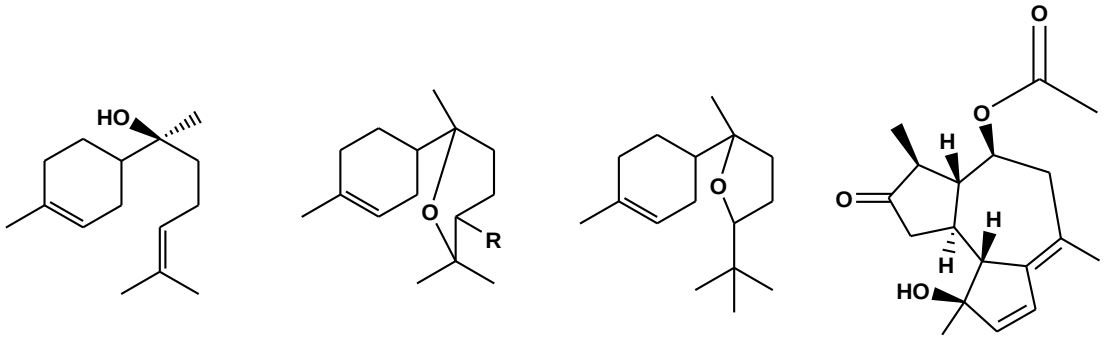
4. RESULTS and Discussion:

4.1. Matricaria chamomilla Chemical Composition:

The components of the oils were identified by GC/Mass, The Peaks identification and relative amounts of the various compounds present in the volatile fraction appear in Table 1. A total of 49 compounds were characterized representing 83% of the essential oil. The oil was dominated by many compounds representing the majority components: Bis-abolol oxide A (2.21%), O-cimene(0.29%), α-Farnesene (0.18%), Spathulenol (0.15%), Camazulene(1.69%), this match with the studies concerning. Matricaria chamomilla in references [7,c.619]. The other compounds were presented in low percentages. The analyse of (table 1) shows that most of compounds are identified in the essential oil of in other species Matricaria chamomilla, but with difference in proportions. However, another report on the oil had α-Farnesene which found as the main compound. Some differences can occur in composition of oils from the same plant species probably due to genetic variation and different environmental factors (climate, harvesting seasons, geographical location) [8,c.407].

It is important to said that the by bis-abolol oxideA (2.21%) occurs as a major compound of ERL (Table 1) followed by α-camazulene (1.96%). The oil chamomilla is sometimes preferred by aroma-therapists, because its fragrance is more pleasant than EGL. This oil appears to be useful for treating disorders of skin in pharmaceutical because it is known with a high bis-abolol oxide B content of about 80% for medicinal purpose, [9,c.2768]. It is possible to classify the

essential oil of Matricaria chamomilla in four chemotypes in function of the composition of major component : chemotypes A is characterized by bis-abolol oxide A as a main component. Chemotypes B is characterized by bis-abolol oxide B as main component, chemotypes C is characteristics by α- bis-abolol as main component, chemotypes D is characteristics by comparable amounts of α-bis-abolol and bis-abolol oxide A and B), another types is characterized by α-bis-abalone oxide A as main component or the green essential oil with low amount of matricin in essential oil [10,c.76].



(-)-α-bisabolol **(-)-α-bisabolol oxide A (R= OH)** **(-)-α-bisabolol oxide B** **Matricine**

(-)-α-bisabolone oxide A (R= O)

Figure 1. As the percentage of bis-abalone oxide A is main component that is main the studied essential oil is from Type A

Table 1.

Chemical composition of essential oil extracted of of Matricaria chamomilla

No	RT	compunds	%	duial
1	7.28	3,3,6-Trimethyl-1,4-heptadien-6-ol	0.16	72
2	8.93	O-Cimene	0.29	91
3	10.69	3-Aminopyrazole	0.11	72
4	16.46	1-Terpinen-4-ol	0.11	95
5	23.39	Anisole-p-propenyl	1.07	98
6	25.45	Caryophyllene	0.18	98
7	26.67	Farnesene	2.46	98
8	29.17	α-Farnesene	0.18	93
10	33.59	(7S)-trans-bicyclo[4.3.0]-3-nonen7-ol	0.35	46
12	34.26	Spathulenol	0.15	90
13	36.61	Epi-bicyclo sesquiphellanderen	0.36	90
14	37.92	α-Bisabolol	0.39	74
15	40.77	Bisabolol oxide A	2.21	93
16	40.88	Brevifolin	0.10	93
17	41.03	2-Pentadecanone,6,10,14-trimethyl	0.43	55

18	41.42	Camazulene	1.69	99
19	43.12	Palmitic acid-methyl ester	0.14	95
20	43.96	Coumarin,7methoxy	0.26	93
21	44.92	1,2-Benzenedicarboxylic acid	0.12	80
22	44.95	Heneicosan	0.08	98
23	46.72	Hexadecane,7,9-dimethyl	0.31	89
24	46.90	1H-Idene,5-buty-6-hexyloctahydr	0.11	91
25	47.27	2,5-Furandione,3-dodecenyl	0.08	92
26	47.58	1,6-Dioxaspiro[4.4]non-3-ene,4-hexadiynylidene	3.50	95
27	48.35	Nonadecane	0.70	95
28	48.89	Cyclohexene	0.27	95
29	50.47	Sclareoloxide	1.23	60
30	50.57	Benzamide	1.40	95
31	50.92	Cembrane	0.31	81
32	51.00	9-Undecen-2-one,6,10-dimethyl	1.64	91
33	50.67	Cyclotetradecane,1,7,11-trimethyl-4-(1-methylethyl)	0.57	70
34	51.28	Nonadecane-9-methyl-	2.13	93
35	52-21	(E) 8-Methyl-9-tetradecen-1-ol	1.14	58
36	52.64	Eicosane	2.77	98
37	53.19	Beta-iso-Methyl ionone	3.35	58
38	54.37	1-Bromo-11-iodundecane	0.30	80
39	53.56	E-8-Methyl-9-tetradecen-1-ol acetate	0.97	70
40	53.65	1,3,1,12-Nonadecatriene-5,14-diol	0.64	58
41	54.24	Cembrane	1.09	83
42	54.64	Eicosane	0.60	86
43	54.81	Hexadecane-2-Methyl	1.33	59
44	55.18	Tetratetacontane	0.89	87
45	55.28	1-Bromo-11-iodoundecane	1.09	46
46	55.66	1-Naphthalenepropanol	1.22	46
47	56.05	Hexadecane,2,6,10,15-tetramethyl	2.31	62
48	56.38	Heptadecane	1.01	89
49	56.75	Heptadecane-2-methyl	2.25	92

The essential oil exhibit significant activity against the pathogenic bacteria including: *Staphylococcus aureus* in comparing to the gentamicin

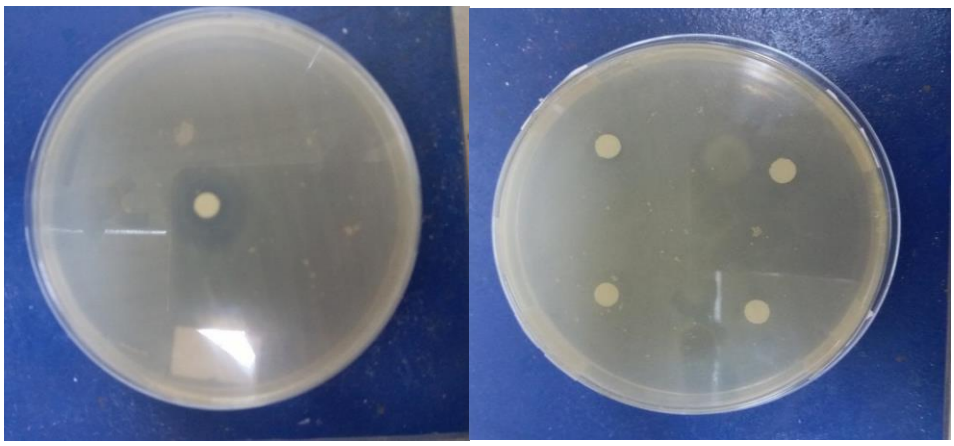


Figure 2: The zones of inhibition by essential oil of against to the growing of Staphylococcus aureus of Matricaria chamomilla

Table 2.

The activity of essential oil of Urtica pilulifera, it is calculated by measuring the diameter of the inhibition zone (mm).

Org.	Essential oil µ				
	100%	50%	25%	gentamicin	DMSO
Staph. aureus	3±0.52	-	-	4.5	-

4.2. Conclusion:

The Matricaria *chamomilla* from *asteraceae* is a natural source of antimicrobial. The Quantitative and qualitative analysis of the essential oil was identified using GC-MS. 17 compounds, The major components were Bis-abolol oxide A (2.21), Camazulene(1.69%), O-cimene(0.29%), α-Farnesene (0.18%), Spathulenol (0.15%).The percentage of α bisabolol oxide A is main component that is main the studied essential oil is from Type A. The antimicrobial activity of the essential oil with different concentrations (500µml-1000 µml) against the isolated bacteria extracted from the acne have been studied. The essential oil exhibits primary antimicrobial activity against staphylococcus aureus with (100% of essential oil). therefore, it can be used as a medical medicinal drug as anti-bacterial and inflammation. And it can be also described in the treatment of many diseases.

5. Acknowledgement:

The author expresses his thanks to central organic laboratory in, department of chemistry, AL Baath University, faculty of sciences, for their assistance during the work.

References

1. Ozer, B.C., Ozyoruk, H., Celebi, S.S., Yildiz, A; Amperometric enzymeelectrode for free cholesterol determination prepared with cholesteroloxidase immobilized in poly (vinylferrocenium) film /Ozer, B.C., Ozyoruk, H., Celebi, S.S., Yildiz, A// Enzyme Microb.Technol.–2007–№ 40(2) . - P. 262-265.

2. Jeffrey; Compositae: Introduction with key to tribes. Families and Genera of Vascular Plants /Jeffrey; Compositae//.–2007–№ 8 . - P. 61-87.

3. Ghasemi, M., Babaeian, J., Jelodar, N., Modarresi, M., Bagheri, N., Jamali, A; Increase of Chamazulene and α-Bisabolol Contents of the Essential Oil of German Chamomile (Matricaria chamomilla L.) Using Salicylic Acid Treatments under Normal and Heat Stress Conditions. J. Foods Ghasemi, /M., Babaeian, J., Jelodar, N., Modarresi, M., Bagheri, N., Jamali, A//.–2015–№ 5(3) . - P. 56-62.

4. Panero, J., Funk, V.A; Toward a phylogenetic subfamilial classification for the Compositae (Asteraceae) /Panero, J., Funk, V.A//.–2002–№ 15(4) . - P. 760-773.

5. Alireza, M; Antimicrobial activity and chemical composition of essential oils of chamomile from Neyshabur, Iran. Journal of Medicinal Plants Research /Alireza, M//.–2012–№ 6(5) . - P. 820-824.

6. Al-Oudat, K. Salkini, A., Tiedeman, J; Major Native Plant Species in Khanasser Area, International Center for Agricultural Research in the Dry Areas , Syria /Al-Oudat, K. Salkini, A., Tiedeman, J//.–2005–№ 3. - P. 128-132.

7. McKay, D.L, Blumberg, J.B; A review of the bioactivity and potential health benefits of peppermint tea (Mentha piperita L.). Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation

of Natural Product Derivatives /McKay, D.L, Blumberg, J.B//.–2006–№ 20(8) . - P. 619-633.

8. Pereira, S.I., Freire, C.S.R., Neto, C.P., Silvestre, A.J.D., Silva, A.M.S; Chemical composition of the essential oil distilled from the fruits of Eucalyptus globulusgrown in Portugal. Flavour Frag J /Pereira, S.I., Freire, C.S.R., Neto, C.P., Silvestre, A.J.D., Silva, A.M.S//.–2005–№ 20. - P. 407–409.

9. Heuskin, S., Godin, B., Leroy, P., Capella, Q., Wathelet, J.P., Verheggen, F., Haubruge, E.Lognay, G; Fast gas chromatography characterisation of purified semiochemicals from essential oils of Matricaria chamomilla L.(Asteraceae) and Nepetacataria L.(Lamiaceae). J. Chromatogr /Heuskin, S., Godin, B., Leroy, P., Capella, Q., Wathelet, J.P., Verheggen, F., Haubruge, E.Lognay, G// .–2009–№ 1216. - P. 2768–2775.

10. SharifiRad, M., Nazaruk, J., Polito, L., Morais-Braga, M.F.B., Rocha, J.E., Coutinho, H.D.M., Salehi, B., Tabanelli, G., Montanari, C., del Mar Contreras, M. and Yousaf, Z; Matricaria genus as a source of antimicrobial agents: From farm to pharmacy and food applications. Microbiological Research. /SharifiRad, M., Nazaruk, J., Polito, L., Morais-Braga, M.F.B., Rocha, J.E., Coutinho, H.D.M., Salehi, B., Tabanelli, G., Montanari, C., del Mar Contreras, M. and Yousaf, Z //–2018–№. – 215. P. 76–88.