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Research Article

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Commiphora myrrha and commiphora Africana essential oils

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ABSTRACT

From generation to generation in all countries all around the world medicinal plants play an important role in our live from ancient time till these days of wide drugs and pharmacological high technique industries , the studding of biological and pharmacological activities of plant essential oils attracted the attention to the potential use of these natural products from chemical and pharmacological investigation to their therapeutic aspects. In this paper two resins commiphora Africana and commiphora myrrha were selected to discuss their essential oils for chemical analysis and biological aspect the results of GCMS shows that the two resins are rich in sesqiuterpenes and sesqiuterpene lactones compounds that possess anti-inflammatory and antitumor activity Antibacterial and antifungal bioassay shows antibacterial and antifungal activity higher in the myrrha oil than the Africana oil while antiviral bioassay shows higher antiviral activity in the Africana oil than myrrha oil

Key words: burseraceae, Essential oil, Sesquiterpenes, GCMS, brine shrimbs, NDV.

INTRODUCTION

The genus Commiphora (Burseraceae) includes over 150 species of trees and shrubs, distributed mostly in East Africa, Arabia and India (1).The comminphora myrrha tree produces a type of aromatic resin known as myrrh (mur higazy) ,commiphora Africana tree produce gum resin known in sudan as gafal resin . name Commiphora may be based on the Greek words kommi gum and phero to bear (2) Biblically, Myrrh was given to Christ at his birth. It was esteemed higher and cost more than gold. The Muslim physician al-Razi the greatest of all medieval clinicians, used myrrh to treat ailments of the kidneys and bladder, to dissipate swellings in the stomach . (3)

Essential oils have been used for a wide variety of purposes including perfumes, cosmetics, aromatherapy , secondary metabolites .Terpenes and terpenoids are the most important constituents in essential oils terpenes are distributed in the plant kingdom (4) pharmaceuticals composition reported some sesquiterpene lactones in treating some diseases , helenalin is a anti-inflammatory drug and parthenolide a sesquiterpene lactones with anti cancer effect (5 .6) .Gas chromatography mass spectroscopy were used to identify chemical components in essentialn oils (7)

EXPERIMENTAL SECTION

2.1.Plant materials

Commiphora Africana resin were collected from the western sudan (Jabal mara),and identified by Dr. Mohamed Elmubark at sudan university of science and technology resins unit and commiphora myrrh resin which is known and widely used in sudan and Arabic and African countries were bought from Omdurman market ,their essential oil were extracted by steam distillation at the researches centre of medicinal and aromatic plants at Khartoum Sudan . 200 gm of each resin were grinded and the oil extracted by steam distillation .6.5 ml. of C.myrrha essential oil were yielded while only 2ml. of C. Africana were yielded .

2.2.Thin layer chromatography:

Thin layer chromatography was carried out for commiphora Africana and commiphora myrrh essential oils, Pre-coated silica gel plate used a stationary while Petroleum ether: Di-ethyl ether (9: 1) and Toluene : Ethyl acetate (93: 7) were used as mobile phase 0.2 ml of the samples was dissolved in 105 ml of methanol and applied to the bottom of the plated at 2 cm using capillary tube. Plate was kept to dry by air and then inserted in tank containing the selected solvent system. After reached the height of 15 to 20 cm, plate was took out and allowed to air till solvent was completely evaporated. The plate was inspected in day light, then examined under UV lamp and finally sprayed with para anizaldehyde spray reagent and heated at 100 C for about five minutes. Rf values of separated compounds which appeared under UV , after sprayed and heated retention factors were calculated as follows.

$$Rf = \frac{\text{distant travelled by sample}}{\text{distant travelled by solvent}}$$

Photo 2. 2. TLC plate of C.AF oil and C.MR oil

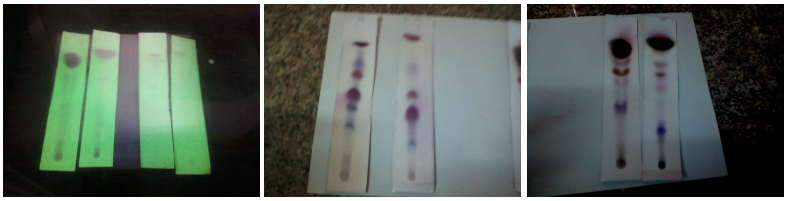


Table 2.2.1 Retention factor of commiphora Africana oil (petroleum ether and diethyl ether (9 : 1)

Spot	1	2	3	4	5	6	7
Rf	0.2	0.3252	0.4172	0.5460	0.7362	0.8098	0.9754

2.2.2 Retention Factor of Commiphora Africana oil (Toluene and Ethyl acetate (93:7)

Spot	1	2	3	4	5	6	7
Rf	0.3333	0.5333	0.5666	0.7333	0.8000	0.9333	0.9867

Table 2.2.3 Retention Factor of Myrrha oil (petroleum ether and diethyl ether 9:1)

spot	1	2	3	4	5	6	7
Rf	0.16266	0.21687	0.5422	0.6458	0.7169	0.8132	0.8916

Table2.2.4 Retention factor of Myrrha oil (Toluene and Ethyl acetate93:7

Spot	1	2	3	4	5	6	7
Rf	0.3354	0.4051	0.0613	0.6709	0.7532	0.8798	0.9403

2.3.Gas chromatography mass spectroscopy

GC/MS is the method for identifying volatile compounds in complex mixtures. GCMS of these oils were done to investigate chemical compounds in Commiphora .africana and Commiphora. myrrha oils . GCMS analysis were done at the instrumentation lab of central petroleum laboratories Khartoum. the results shows they were rich in terpenes specially sesquiterpene and sesquiterpene lactones and diterpenes which have wide interest for their biological activities such as anti inflammatory and anti cancer effect

Figure 2.3.1 commiphora Africana essential oil chromatogram

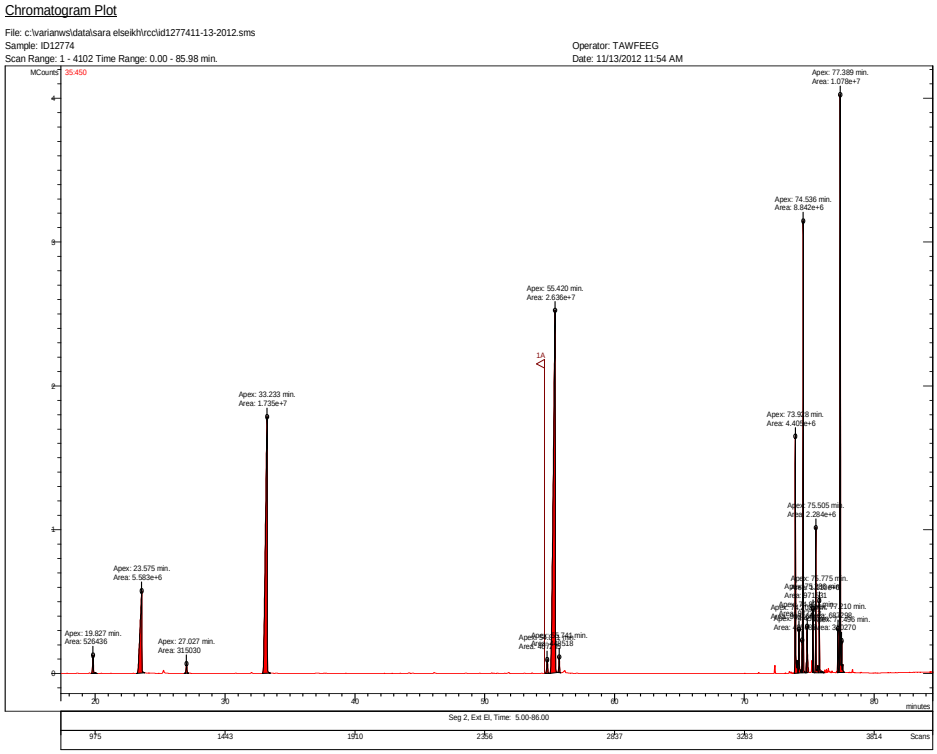


Table 2.3.1 Chemical compounds in commiphora Africana oil detected by GCMS

NO	NAME	FORMULA	RT	MW	AREA	AREA%
1	Cyclobutane, 1,2-bis(1-methylethenyl)-, trans-	C10H16	19.827	136	526436	0.6356
2	trans-4-Decene	C10H20	23.575	140	558300	6.741
3	trans,trans-3,5-Heptadien-2-one	C7H10O	27.027	110	315030	0.3804
4	Cyclopropane, octyl-	C11H22	33.233	154	173500	20.95
5	Ethanone, 1-(1,3-dimethyl-3-cyclohexen-1-yl)-	C10H16O	54.811	152	467205	0.5641
6	1,4-Methanoazulene, decahydro-4,8,8-trimethyl-9-methylene-, [1S-(1à,3aá,4à,8aá)]-	C15H24	55.420	204	263600	31.83
7	Ethanone, 1-(1,4-dimethyl-3-cyclohexen-1-yl)-	C10H16O	55.741	152	448518	0.5415
8	1,3,6,10-Cyclotetradecatetraene, 3,7,11-trimethyl-14-(1-methylethyl)-, [S-(E,Z,E,E)]-	C20H32	73.928	272	440500	5.319
9	Podocarpa-6,13-diene, 13-isopropyl-	C20H32	74.203	272	908464	1.097
10	Kaur-16-ene, (8á,13á)-	C20H32	74.453	272	495685	0.5985
11	Kaur-16-ene	C20H32	74.536	272	884200	10.68
12	Phenanthrene, 7-ethenyl-1,2,3,4,4a,4b,5,6,7,9,10,10a-dodecahydro-1,1,4a,7-tetra methyl-, [4aS-(4aà,4bá,7á,10aá)]-	C20H32	74.837	272	977313	1.180
13	17-Norkaur-15-ene, 13-methyl-, (8á,13á)-	C20H32	75.286	272	971531	1.173
14	Podocarpa-6,13-diene, 13-isopropyl-	C20H32	75.505	272	228400	2.758
15	Isodihydrohistrionicotoxin 285a	C19H27NO	75.775	285	111000	1.340
16	Bicyclo[9.3.1]pentadeca-3,7-dien-12-ol, 4,8,12,15,15-pentamethyl-, [1R-(1R*,3E, 7E,11R*,12R*)]-	C20H34O	77.210	290	687298	0.8299
17	Cyclopentanemethanol, 5-methyl-2-[1-methylene-3-(5-isopropyl-2-methylcyclopent-1-enyl)propyl]-	C20H34O	77.389	290	107800	13.02

Figure 2.3.2 Commiphora Myrrha Oil GCMS chromatogram

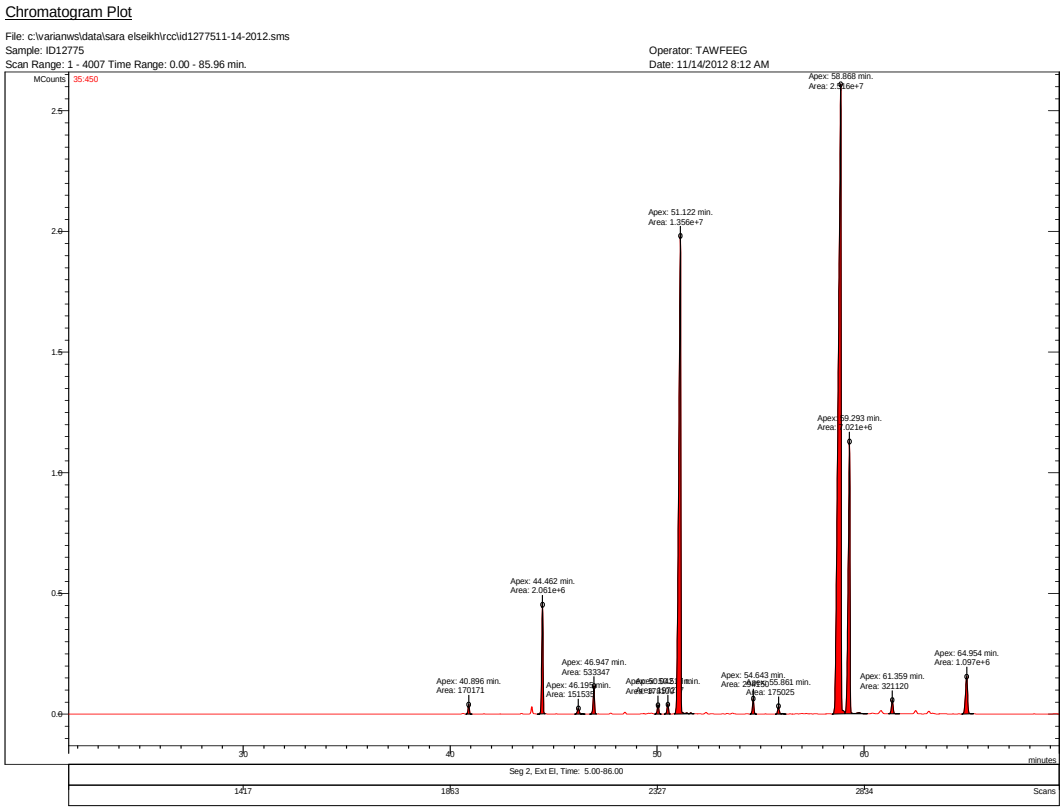


Table table 2.3.2 Chemical compounds detected in Commiphora myrrh Essential oil by GCMS

NO	NAME	FORMULA	RT	MW	AREA	AREA%
1	Cyclohexene, 4-ethenyl-4-methyl-3-(1-methylethenyl)-1-(1-methylethyl)-, (3R-trans)-	C15H24	40.896	204	170171	0.3342
2	Longifolene-(V4)	C15H24	44.462	204	2061000	4.048
3	Caryophyllene	C15H24	46.195	204	151535	0.2976
4	1,4-Methanoazulene, decahydro-4,8,8-trimethyl-9-methylene-, [1S-(1à,3aá, 4à,8aá)]-	C15H24	46.947	204	533347	1.047
5	1,6-Cyclodecadiene, 1-methyl-5-methylene-8-(1-methylethyl)-, [s-(E,E)]-	C15H24	50.042	204	178100	0.3498
6	Naphthalene, 1,2,3,5,6,7,8,8a-octahydro-1,8a-dimethyl-7-(1-methylethenyl)-, [1S-(1à,7à,8aà)]-	C15H24	50.517	204	197277	0.3874
7	Benzofuran, 6-ethenyl-4,5,6,7-tetrahydro-3,6-dimethyl-5-isopropenyl-, trans-	C15H20O	51.122	216	13560000	26.63
8	1H-Cycloprop[e]azulene, decahydro-1,1,7-trimethyl-4-methylene-, [1aR-(1aà, 4aá,7à,7aá,7bà	C15H24	54.643	204	294150	0.5777
9	meso-Hydrobenzoin	C14H14O2	55.861	214	175025	0.3437
10	1(2H)Phenanthrenone, 3,4,4a,9,10,10a-hexahydro-4a-methyl-	C15H18O	58.868	214	25160000	49.41
11	Benzenemethanol, 3-methoxy-à-phenyl-	C14H14O2	59.293	214	7021000	13.79
12	Cyclohexanemethanol, 4-ethenyl-à,à,4-trimethyl-3-(1-methylethenyl)-, [1R-(1à,3à,4á)]-	C15H26O	61.359	222	321120	0.6306
13	Testosterone	C19H28O2	64.954	288	1097000	2.154

3.1 Antibacterial and antifungal bioassay

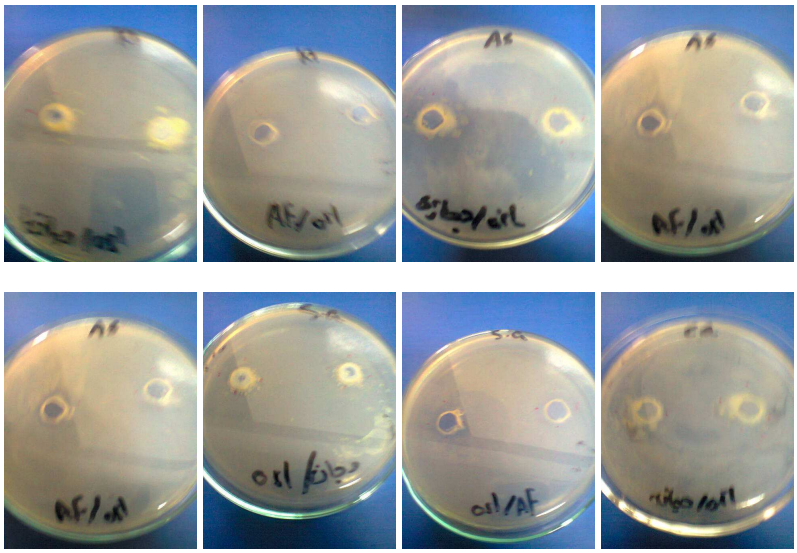
Commiphora myrrha and commiphora Africana oils were tested on their antibacterial and antifungal activity at microbiology lab in medicinal and aromatic plants researches centre in Khartoum , staphauries and klebsilla bacteria were selected to test the oils anti bacterial effect while Candida and Aspergillus fungi were selected to test the antifungal activity bellow results reported the inhibition zone of bacteria or fungi growth measured in millimetres.

Table 3.1 Commiphora myrrha and commiphora Africana essential oil antibacterial and antifungal results of diameter of growth inhibition zone in millilitres

Bacteria or fungi	S.a	K.p	A.n	C.a
C.AF oil	16	15	17	19
C,MR oil	18	17	18	20

C.AF commiphora Africana . C.MR commiphora myrrha . S.a Staphylococcus aureus . K.p Klebsiella pneumoniae . A.n Aspergillus niger . C.a Candida albica

Photo 3.1 inhibitition zone by Myrrha oil and Africana oil in Petri dish



3.2. Brine shrimp lethality bioassay

Brine shrimp lethality bioassay is a simple method to investigate the cytotoxcisisty Of extracts of medicinal plants . Brine shrimps (Artemia salina) were hatched using sterile artificial seawater (prepared using sea salt 38 g in one litre distilled water) and let to 24 hours After hatching, ten active nauplii free from egg shells were collected from brighter portion of the hatching chamber and used for the assay. three beaker prepared for each concentration as follows , 0.02 ml of the oil dissolved in 2 ml ethanol to form 1000 PPM , then 0.2 ml from it were added to 1.8 ethanol to reach 100 PPM and from this 0.2 ml were added to 108 ethanol to have 10 PPM . these three concentration kept to add them to the hatched nauplii , . Ten nauplii were drawn through a glass capillary and placed in small beaker contain the prepared oil and artificial sea water were added to complete five millilitre and maintained at room temperature for 24 h under the light and surviving larvae were counted. To calculate LC50 for each oil .Caffeine LC50 306 ug/ml used as positive control and ethanol LC50 1000 ug/ml is negative control

Table 3.2.1 shrimps bioassay results of commiphora african oil

concentration	1000ug/ml	100 ug/ml	10 ug/ml	Lc50 ug/ml
Percent death	100	90	76.67	60

Table 3.2.2 Shrimps bioassay of commiphora myrrha oil

concentration	1000ug/ml	100ug/ml	10ug/ml	Lc50ug/ml
Percent death	86.67	73.33	63.33	68

3.3.Antiviral bioassay

Antiviral test were held at veterinary research institute virology section towards Newcastle virus (NDV) on chicken embryo nine days old, according to Rajbahndari et al. method with some modifications , 0.1ml of NDV suspension was treated with 0.1 ml of pure oil and 0.1ml of ethanol diluted oil 50% ,and the treated viruses were incubated at 4ºC for about 1 h. The treated viruses and the controls were then inoculated via the allantoic sac of 9 day old chick embryos for NDV. Hank's balanced salt solution (negative control) and the virus without treatment (positive control) were used as controls. Triplicate tests were carried out for each oil against the virus, the results were compared to the sample without treatment

Antiviral screening of the two oil

Commiphora Africana Essential Oil : The pure and the ethanol oil shows high and clear antiviral activity

Commiphora Myrrha essential oil: The pure myrrha oil shows high antiviral activity while the ethanol oil shows moderate antiviral activity

RESULTS AND DISCUSSION

Results of GCMS shows different terpene compounds in C.Af and C.Mr oils monoterpene, sesquiterpene, sesquiterpene lactones and diterpene which have therapeutic aspects (8) , Caryophyllene C15H24 which found in myrrha oil Anti-tumour antibacterial, anti- inflammatory .C19H27NO which found in Africana oil pentazocine pain reliever. And , C20H32 refer to Kaurene may serve as a leading compound for the development of new chemotherapeutic drugs to overcome resistance of tumours to chemotherapy. (9) were found in commiphora africana oil

CONCLUSION

Commiphora myrrha and Commiphora Africana oils have antibacterial and antifungal activities and were rich in compounds that play important role in therapy ,Commiphora Africana oil shows clear and high antiviral activity towards NDV more investigation can lead to control this aggressive virus , low LC50 values of the two oils explains their cytotoxicity and anti-tumour properties ,the main chemical compounds in the two oils were found as sesquiterpenes and sesquiterpene lactones the antitumor properties of sesquiterpene lactones have attracted a good interest ,more investigation is needed for these oils and their components can lead to interesting pharmaceuticals natural products

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