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IDENTIFICATION OF ANTIOXIDANT COMPOUND AND ANTIFUNGAL ACTIVITY IN *FAGONIA BRUGUIERI* DC

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ABSTRACT

Fagonia bruguieri DC. is reported as a rare plant species from the Thar Desert. The plant is known for its adaptation to arid climatic conditions. A report on antioxidant phytochemicals in ethyl acetate fraction is not yet documented. In the present study, the presence of polar compounds in acetate fraction was identified by GC-MS assay. Antifungal activity was also conducted on five different fungal strains (Microsporum canis, Trichophyton rubrum, Epidermophyton floccosum, Penicillium chrysogeum, and Candida albicans). Resulting, GC-MS analysis of fraction identified a total of 16 compounds. Acetone crude extract is able to inhibit the growth of T. rubrum, C. albicans, and P. chrysogeum.

Keywords: *Medicinal Plant, GC-MS, Antimicrobial Compound, Nonpolar Fraction, Antifungal.*

Introduction

Plants are one of the major sources of food, shelter, and medicine. They are also helpful in air refinement. Survival of humans without plants is implausible [1-3]. Many plants are adapted to grow in arid and semi-arid climatic conditions. Some of them belong to the family of Zygophyllaceae. A study on Zygophyllaceae reports estimates 285 species and 22 genera globally [4]. Among them, 10 are reported from the Thar Desert. The Thar Desert is located in between Rajasthan, Gujarat, India and Sindh, Pakistan. Among these plants *Fagonia bruguieri* DC is reported as a rare plant species [5]. Nowadays, the threat causing resistance of antibiotics is a major issue of death. Plants are one of the tremendous sources of biochemicals, that can be useful in many different ways. However, antifungal activity and polar antioxidant phytochemicals from the *Fagonia bruguieri* DC. are not yet reported. In the present study, the polar extract was isolated from the plant. Identification of antioxidant compounds was done by GCMS and Antifungal activity was determined by the agar wall diffusion method.

Material and Method

- **Harvesting of Plant:** Fagonia bruguieri DC. was collectade from Lat.- 27.364792 and Long.- 72.510825(Jaisalmer, Rajasthan, India). Identification was done by Botanical Survey of India, (BSI) in Jodhpur, Rajasthan, India (Pl. Id. No. 402). Collected plant material was washed under tape water followed by double distilled water and dried in Shade.
- **Anti-Fungal Activity:** The anti-microbial activity was done by the maceration method. Less toxic, polar solvent like isopropyl alcohol was used for maceration. The freshly powdered plant was mixed in isopropyl alcohol. The ratio of powdered plant and solvent was 1:10. This mixture was then incubated at 50 degrees Celsius for 24 hours. After incubation filtrate was collected and dried. Different concentrations of the dried filtrate were then dissolved in DMSO (1, 2.5, and 5mg/ml). The Agar well diffusion method was adapted to conduct the antimicrobial activity. For fungus PDA (potato dextrose agar) was used. Microorganisms selected - *Microsporum canis*, *Trichophyton rubrum*, *Epidermophyton floccosum*, *Penicillium chrysogeum,* and *Candida albicans* [6-7].

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- **Isolation of Phytochemical for GC-MS Analysis:** For the identification of polar phytochemicals in the plant, a 10-gram powdered plant sample was defatted with 100 ml petroleum ether (at 37°C for 24 hours). Followed by that the solid residue was collected and dried (at 25°C for 24 hours). Now dried solid residue was again mixed in 10 ml of 85% ethanolic hydrochloric acid and incubated (37°C for 4 hours). After incubation filtrate was collected and taken in a separating funnel, Subsequently 50 ml ethyl acetate was added and mixed thoroughly. Now the upper layer was collected. Two nutrilize the pH of upper layer, the upper layer was again transferred into a new separating funnel. Neutralization of pH was done by distilled water. Finally, ethyl acetate layer was collected and dried. The dried ethyl acetate layer was stored in the refrigerator for further analysis [8].
- **GC MS Analysis:** GC column (Rxi5 Si MS) was used with a diameter of 0.25 mm, length of 30.0 m, and thickness of 0.25 um. The column oven temperature was 50°C. 3 µl of the sample was injected in GC-MS. Injection temperature 250 °C. Due to its low boiling point, density, and solubility helium was used as a carrier gas. The pressure was maintained at 66.8 kPa, the total flow was kept at 23.9 mL/min. flow in the column was at 1.18 mL/min, the linear velocity was at 39.4 cm/sec, and the purge flow was at 5.0 ml/min. The ion source temperature and interface temperature of mass spectrometry was 280 °C. The total time of GC-MS was 30 minutes.

Result and Discussion

Antimicrobial activity-The antimicrobial activity with acetone crude extract of *F. bruguieri* showed the inhibition zone with *C. albicans,* and *P. chrysogeum* at all the tested concentrations. *T. rubrum,* is showing a zone of inhibition on 5 mg/ ml concentration, No zone of inhibition was observed with *M. canis,* and *E. floccosum* (Table 1).

GC-MS analysis of ethyl acetate fraction identified a total of 16 compounds (table 2,3), Heptane, 2,4-dimethyl, 1-Propene-1,2,3-tricarboxylic acid, trimethyl ester, (E), Citric acid, Methyl hexadec-9-enoate, Hexadecanoic acid, methyl ester, Dibutyl phthalate, 2(3H)-Furanone, 5-heptyldihydro, 9,12-Octadecadienoic acid (Z,Z)-, methyl es, 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z), Methyl stearate, Triacontane, 1-iodo, Hexadecanoic acid, methyl ester, Triacontane, 1-iodo, Hexatriacontane, 9-Octadecenoic acid (Z)-, oxiranylmethyl ester, 2-Methylhexacosane, Docosanoic acid, and methyl ester. citric acid and hexadecanoic acid are reported as a antioxidant compound. Hexadecanoic acid is also useful in hypercholesterolemia, and pesticide by nature [9-10]. 9,12-Octadecadienoic acid (Z,Z)- is known for anti-inflammatory property [10]. Hexatriacontane is an antidepressant [11]. Antimicrobial and decreases cholesterol in blood [12]. Docosanoic-acid ib useful in bio-diesel [13].

Table 1: Antimicrobial Activity

CONCENTRATION	*T. RUBRUM*	*M. CANIS*	*E. FLOCCOSUM*	*C. ALBICANS*	*P. CHRYSOGEUM*
5MG/ML	2	00	00	6	6
2MG/ML	+ve	00	00	4	4
1MG/ML	00	00	00	4	2

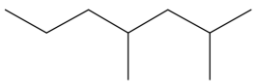
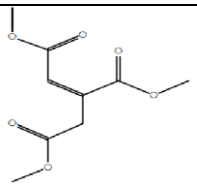
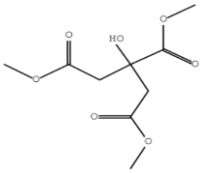
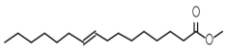
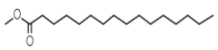
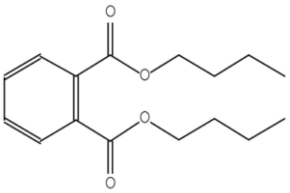
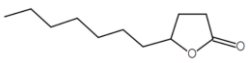
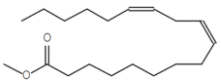
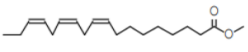
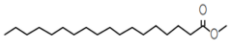
Zone of inhibition in Millimeter

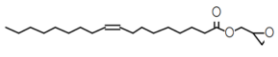
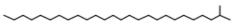
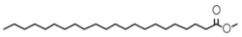
Table 2: GC-MS of Assay Ethyl Acetate Fraction

S. No.	RT	Compound Name	Molecular Formula	Molecular Weight g/Mole
1	3.907	Heptane, 2,4-dimethyl	C_9H_{20}	128
2	16.348	1-Propene-1,2,3-tricarboxylic acid, trimethyl ester, (E)-	$C_9H_{12}O_6$	216
3	16.899	Citric acid, trimethyl este	$C_9H_{14}O_7$	234
4	23.594	Methyl hexadec-9-enoate	$C_{17}H_{32}O_2$	268
5	23.663	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270
6	24.087	Dibutyl phthalate	$C_{16}H_{22}O_4$	278
7	25.227	2(3H)-Furanone, 5-heptyldihydro	$C_{11}H_{20}O_2$	184
8	25.579	9,12-Octadecadienoic acid (Z,Z)-, methyl es	$C_{19}H_{34}O_2$	294
9	25.647	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	$C_{19}H_{32}O_2$	292
10	25.906	Methyl stearate	$C_{19}H_{38}O_2$	289
11	27.737	Triacontane, 1-iodo	$C_{30}H_{61}I$	548
12	30.416	Triacontane, 1-iodo-	$C_{32}H_{65}I$	576

13	28.530	Hexatriacontane	$C_{36}H_{74}$	506
14	29.244	9-Octadecenoic acid (Z)-, oxiranyl methyl ester	$C_{21}H_{38}O_3$	338
15	29.430	2-Methylhexacosane	$C_{27}H_{56}$	380
16	29.708	Docosanoic acid, methyl ester	$C_{23}H_{46}O_2$	354

Table 3: Structure of the Compounds

 Heptane, 2,4-dimethyl	 1-Propene-1,2,3-tricarboxylic acid, trimethyl ester, (E)-
 Citric acid, trimethyl este	 Methyl hexadec-9-enoate
 Hexadecanoic acid, methyl ester	 Dibutyl phthalate
 2(3H)-Furanone, 5-heptyldihydro	 9,12-Octadecadienoic acid (Z,Z)-, methyl es
 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	 Methyl stearate
Triacontane, 1-iodo- Triacontane, 1-iodo	Hexatriacontane

		
9-Octadecenoic acid (Z)-, oxiranyl methyl ester	2-Methylhexacosane	Docosanoic bacid, methyl ester

References

1. Bagban IM, Roy SP, Chaudhary A, Das SK, Gohil KJ, and Bhandari KK. (2012). "Hepatoprotective activity of the methanolic extract of Fagonia indica Burm in carbon tetra chloride induced hepatotoxicity in albino rats." Asian Pacific Journal of Tropical Biomedicine 2 (3): S1457-S1460. doi:https://doi.org/10.1016/S2221-1691(12)60437-7
2. Soomro AL, and Jafarey NA. (2003). "Effect of Fagonia indica on experimentally produced Tumours in Rats." Jourrnal of Pakistan Medical Association 53 (6). https://jpma.org.pk/article-details/180.
3. Shehab N G, Mahdy A, Khan SA, and Noureddin SM. (2011). "Chemical constituents and biological activities of Fagonia indica Burm F." Research Journal of Medicinal Plant 5 (5): 531-546. doi:10.3923/rjmp.2011.531.546.
4. singh v, Parmar PJ, and Pandey RP. (1987). Flora of India. Edited by B.V. Setty and V. Singh. Vol. 1. Flora of Rajasthan vols. Botanical survey of india. pp 161-167.
5. Bhandari M M. (1990). Flora of the Indian Desert. pp 79.
6. Magaldi, S., Mata-Essayag, S., Hartung de Capriles, C., Perez, C., Colella, M., Olaizola, C., & Ontiveros, Y. (2004). Well diffusion for antifungal susceptibility testing. International Journal of Infectious Diseases, 8(1), 39-45. doi:10.1016/j.ijid.2003.03.002
7. Okeke, M., Iroegbu, C., Eze, E., Okoli, A., & Esimone, C. (2001). Evaluation of extracts of the root of Landolphia owerrience for antibacterial activity. Journal of Ethnopharmacology, 78(2-3), 119-127. doi:10.1016/s0378-8741(01)00307-5
8. Tomita, Y., Uomori, A. & Minato, H., (1970). Steroidal sapogenins and sterols in tissue cultures of dioscorea tokoro. Phytochemistry, 9(1), pp. 111-114.
9. Siswadi, S. & Saragih, G. S., (2021). Phytochemical analysis of bioactive compounds in ethanolic extract of sterculia quadrifida R.Br. International conference on life sciences and technology (*ICoLiST 2020).*
10. Diab, T. A., Donia, T. & Saad-Allah, K. M., (2021). Correction to: Characterization, antioxidant, and cytotoxic effects of some Egyptian wild plant extracts. *Beni-Suef University Journal of Basic and Applied Sciences,* 10(1).
11. Anon., (2017). Pharmacological repositioning of Achyranthes aspera as an antidepressant using pharmacoinformatic tools PASS and PharmaExpert: a case study with wet lab validation. *SAR and QSAR in Environmental Research,* pp. 69-81.
12. Khatua, S., Pandey, A. & Biswas, . S. J., (2016). Phytochemical evaluation and antimicrobial properties of Trichosanthes dioica root extract. *Journal of Pharmacognosy and Phytochemistry,* pp. 410-413.
13. Banakar , P. & Jayaraj, M., (2018). GC-MS analysis of bioactive compounds from ethanolic leaf extract of waltheria indica linn. and their pharmacological activities. *International Journal of Pharmaceutical Sciences and Research,* 9(5), pp. 2005-2010.

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