REVIEW ARTICLE

RECORDS OF PHARMACEUTICAL AND BIOMEDICAL SCIENCES

Review Article on Chemical Constituents and Biological Activity of *Artemisia monosperma*.

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Abstract

Asteraceae, often known as Compositae, is one of the largest angiospermic plant families among dicotyledonous, based on the enormous number of species (1,620 genera and 23,600 species). The Asteraceae family includes several large and widely dispersed genus, Artemisia being one of the most common in the Northern Hemisphere. There are 500 species of the genus Artemisia worldwide. Several species of Artemisia have been reported to contain numerous phytochemicals such as polyphenols, phenolic acids, flavonoids, acetylenes and triterpene. *Artemisia monosperma* (Delile) is a perennial fragrant plant that grows widely in the deserts of Middle East, Africa and China. This plant is commonly used in folk medicine as a remedy of a wide range of illness. The choice of the plant was based on the good previous biological study of *A. monosperma* plant extract it was found to have anticancer, antimicrobial and anti-diabetic activities. This review highlights the phytochemical constituents of this important and valuable genus as well as its different reported biological activities. Definitively, the plant extract of *A. monosperma* good source of health strengthening constituents which can be used for curative and nutritional purposes, therefore there is need for further studies on the active compounds of this plant so as to optimize their medicinal and nutritional values.

Keywords: *Artemisia monosperma***,** phytochemicals, flavonoids, biological activity.

1. Introduction

Since the beginning of time, plants have been used in Nation Medicine as pharmaceuticals and thought to supply nutritional powers for people **(Zayyat *et al.*, 2018*)*.** Many of these natural compounds later developed into potential new medicines **(Dias *et al.*, 2012).** *Artemisia monosperma* (Delile) is a green aromatic perennial shrub that belongs to the family Asteraceae **(Abu-Niaaj *et al.*, 2018)**. The genus Artemisia includes a variable number of species (from 200 to more 400). The taxonomy of Artemisia has always been a problem due to the morphological complexities within its species. The last classification divides the genus into six major groups like *Absinthium DC., Artemisia L., Dracunculus.,Pacifica, Seriphidium Besser, and Tridantatae (Hussain & Sciences, 2020).* The current systematic classification of *A. monosperma* is listed in Table 1.

A. monosperma found throughout the northern half of the world is native to: Egypt, Gulf countries, Kuwait, Lebanon, Syria, Libya, Oman, Palestine, Saudi Arabia, and Sinai.

Figure 1: A photo of *A. monosperma* distribution.

Table 1: The systematic classification of *A. monosperma*

Division	Tracheophyta
Class	Angiosperms
Superorder	Asteranae
Order	Asterales
Family	Asteraceae
Genus	*Artemisia*
Species	*monosperma.*

We will focus on *A. monosperma* , The wide-range of biological activities of *A. monosperma* is due to its content of a variety of secondary metabolites such as flavonoids (Saleh et al., 1987), coumarins **(Hammoda *et al.*, 2008)**, fatty acids **(Al-Watban *et al.*, 2012)**, sterol **(Elgamal *et al.*, 1997)**, and terpenoids **(Soliman *et al.*, 2007)**.

2. Chemical constituents reported from *A. monosperma* :

2. 1. Fatty acid

Fatty acids were isolated and identified from the aqueous extract of Artemisia. These include: Lauric acid and Linolenic acid **(Al-Watban *et al.*, 2012)** are listed in Table 2.

2. 2. Terpenoidal and Sterol Compounds

A. monosperma oils have detected the presence of hydrocarbon terpenes, oxygenated terpenes, hydrocarbon sesquiterpenes and oxygenated sesquiterpenes **(Soliman *et al.*, 2007)**. *A. monosperma* has been found to contain taraxasterol, taraxasterol acetate,pseudotaraxasterol acetate, lupeol, β-sitosterol **(Elgamal *et al.*, 1997)** are listed in Table 2.

2. 3. Flavonoids

Flavonoids were isolated and identified from the methanolic extract. These include: eupatorin, ladanein, Arcapillin , cirsilineol , eupatilin, jaceosidin, circimaritin and hispidulin **(Saleh *et al.*, 1987)** are listed in Table**.**

2. 4. Coumarins

Hammoda isolated two new compounds; 6-hydroxy-7,8-dimethoxycoumarin and 5-acetyl-2-[1'-(hydroxymethyl) ethyl]-2,3-dihydrobenzo furan, In addition to well-known compounds; fraxinol, tomentin and methyl-beta-D-fructofuranoside**,** obtained for the first time from the plant **(Hammoda *et al.*, 2008)** are listed in Table 2.

3. Biological activities reported from *A. monosperma* :

3.1 Anti-inflammatory activities

The aqueous extract of *A. monosperma* have potential anti-inflammatory and anti-oxidative stress effects that is mediated by NF-κB and activator protein-1 (AP-1) signaling pathways **(Sadek *et al.*, 2015)**.

3.2 Antioxidant activities

A. monosperma oil extract samples have been potential source of antioxidant activity using the stable 1,1-diphenyl-2-picryl hydrazyl (DPPH) radical and 2,2 -azino-bis (3-ethylbenzothiazoline-6-sulfonic acid (ABTS) **(Sadek *et al.*, 2015)**.

3.3 Antimicrobial activities

The methanolic extracts of *A. monosperma* and showed potent antibacterial activity against both gram positive and gram-negative bacteria than their aqueous extracts **(Zayyat *et al.*, 2018)**.

3.4 Antispasmodic activities

Flavone eupatilin separated from *A. monosperma* has an inhibitory effect on phasic contractions, on the tone of the isolated rat ileum, uterus, and urinary bladder **(Abu-Niaaj *et al.*, 1996)**.

3.5 Cytotoxic activities

Numerous compounds separated from *A. monosperma* such as polyacetylene dehydrofalcarindiol and Capillin showed certain anticancer activity in vitro against colorectal and breast cancer cell line and have been demonstrated to cause apoptosis in a variety of human cancer cell

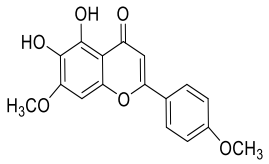
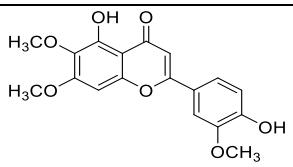
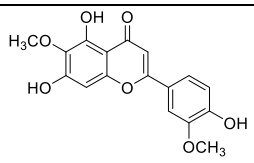
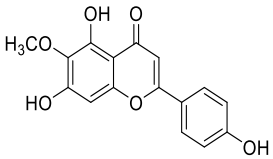
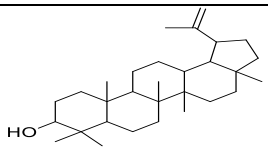
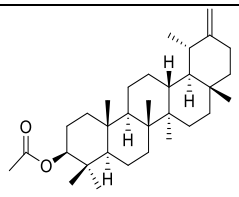
3.6 Antifungal activities

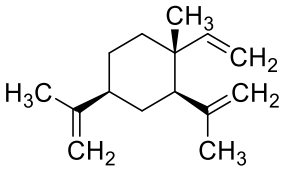
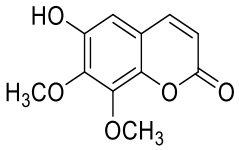
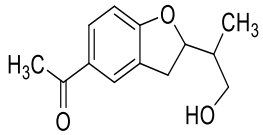
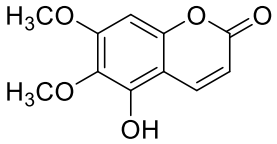
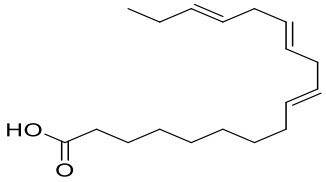
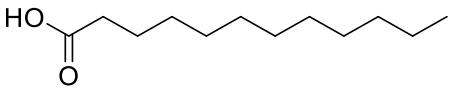
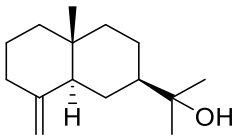
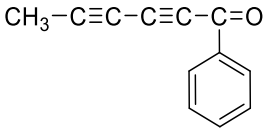
The effectiveness of *A. monosperma* aqueous extracts as antifungal agents against *Fusarium solani sp.*, were examined *in-vivo* **(Hanafy *et al*., 2018)**.

3.7 Hepatoprotective activities

The hepatoprotective activity of an aqueous ethanol extract of *A. monosperma* aerial parts was studied in rats with acute rat hepatotoxicity brought on by carbon tetrachloride. Measurement of liver enzyme markers in the serum was used to assess the hepatoprotective activity of *A. monosperma* (aspartate amino transferase AST; serum alanine transaminase ALT and alkaline phosphatase ALP)**.** The increased AST, ALT, and ALP values brought on by CCl4 therapy were significantly decreased after oral administration of *A. monosperma*. The combined action of flavonoids in *A. momosperma* is likely what causes its hepatoprotective effects **(El-Toumy *et al*., 2011)**. lines, such HT29 colon, pancreatic MIA PaCa-2, epidermal carcinoma of the larynx HEp-2 cells, and lung carcinoma A549 **(Solowey *et al*., 2014)**.

Table 2: Examples of some compounds isolated from *A. monosperma* of family Asteraceae.

Structure	Name	Plant	Reference
	**Ladanein**	***A. monosperma***	**(Saleh *et al*., 1987)**
	**Cirsilineol**	***A. monosperma***	**(Saleh *et al*., 1987)**
	**Jaceosidin**	***A. monosperma***	**(Saleh *et al*., 1987)**
	**Hispidulin**	***A. monosperma***	**(Saleh *et al*., 1987)**
	**Lupeol**	***A. monosperma***	**(Elgamal *et al*., 1997)**
	**Taxasterol acetate**	***A. monosperma***	**(Elgamal *et al*., 1997)**

	***β*-elemene**	***A. monosperma***	**(Soliman *et al*., 2007)**
	**6-hydroxy-7,8-dimethoxycoumarin**	***A. monosperma***	**(Hammoda *et al*., 2008)**
	**5-acetyl-2-[1'-(hydroxymethyl)ethyl]-2,3-dihydrobenzo[b]furan**	***A. monosperma***	**(Hammoda *et al*., 2008)**
	**Tomentin**	***A. monosperma***	**(Hammoda *et al*., 2008)**
	**Linolenic acid**	***A. monosperma***	**(Al-Watban *et al*., 2012)**
	**Lauric acid**	***A. monosperma***	**(Al-Watban *et al*., 2012)**
	***β*-Eudemsol**	***A. monosperma***	**(Ali *et* al., 2016)**
	**1-phenyl,1- one, 2,4 hexadiyne**	***A. monosperma***	**(Ali *et* al., 2016)**

4. Conclusion

A. monosperma is a plant that is widely grown for therapeutic reasons. Biological activities and chemical constituents of the plant are only briefly reviewed here.

5. Conflict of interest

The authors report no declaration of conflict of interest.

References

Abu-Niaaj, L., Abu-Zarga, M., Abdalla, S. 1996. Isolation and inhibitory effects of eupatilin, a flavone isolated from *Artemisia monosperma Del* on rat. Australian Journal of Basic and Applied Sciences, 6, 157- 164.

Abu-Niaaj, L., Katampe, I. 2018. Isolation and Characterization of Flavones from *Artemisia monosperma*. Pharmacognosy Journal, 10, 18-23.

Al-Watban, A., Salama, H. 2012. Physiological effects of allelopathic activity of *Artemisia monosperma* on common bean *(Phaseolus vulgaris L)*. International Research Journal of Plant Science, 3, 158-163.

Ali, D., Verma, A., Ali, H., Al-Amer, A., Alradwan, I. 2016. Photo-induced effect of polycyclic aromatic hydrocarbon on pollen grain germination of *Brassica compestris*. Journal of Fresenius Environmental Bulletin, 25, 4455-4460.

Aziz, R. A., Hasan, E. J., Hussein, Z. 2012. Chemical composition and antimicrobial activity of *Artemisia monosperma* and *Salvia officinalis L*. Plants Journal of the College of Basic Education, 73, 30-39.

Dias, D. A., Urban, S., Roessner, U. 2012. A historical overview of natural products in drug discovery. Metabolites 2012 Journal, 2, 303-336.

Elgamal, M., Ouf, S., Hanna, A., Yassin, F. 1997. Phytochemical and mycological investigation of *Artemisia monosperma*. Folia Microbiologica Journal, 42, 203-210.

El-Toumy, S. A., Omara, E. A., Brouard, I., Bermejo, J. 2011. Evaluation of hepatoprotective effect of *Artemisia monosperma* against carbon tetrachloride-induced hepatic damage rat. Australian Journal of Basic and Applied Sciences, 6, 157- 164.

Hammoda, H., Ela, A., El-Lakany, A., El-Hanbali, O., Zaki, C., Ghazy, N. 2008. New constituents of *Artemisia monosperma Del*. Die Pharmazie-An International Journal of Pharmaceutical Sciences, 63, 611-614.

Hanafy, R. S., El-Mahdy, O. 2018. Mitigation of Fusarium wilt disease of Vicia faba using *Artemisia monosperma* extract. Egyptian Journal of Experimental Biology, 14, 37-37.

Hussain, A. 2020. The genus Artemisia (Asteraceae): A review on its ethnomedicinal prominence and taxonomy with emphasis on foliar anatomy, morphology, and molecular phylogeny. Proceedings of the Pakistan Academy of Sciences: B. Life Environmental Sciences, 57, 1-28.

Sadek, A., Moram, G., Barakat, H. A., Nassar, S. 2015. Anti-tumor, anti-inflammatory and anti-oxidant effects of wormwood *Artemisia monosperma* oil extract on the risks of colon cancer induced in rats. World of Journal Pharm Res., 5, 305-333.

Saleh, N. A., El-Negoumy, S. I., Abou-zaid, M. 1987. Flavonoids of *Artemisia judaica*, *A. monosperma* and *A. herba-alba*. Phytochemistry Journal, 26, 3059-3064.

Soliman, M. 2007. Phytochemical and toxicological studies of *Artemisia L*. (Compositae) essential oil against some insect pests. Journal Archives of Phytopathology, 40, 128-138.

Solowey, E., Lichtenstein, M., Sallon, S., Paavilainen, H., Solowey, E., Lorberboum-Galski, H. 2014. Evaluating medicinal plants for anticancer activity. The Scientific World Journal, 2014, 2356-6140.

Zayyat, M., Khedr, H., Amer, N. 2018. Phytochemical and antimicrobial activity of two Egyptian xerophytes: *Artemisia jaudica L.* and *Artemisia monosperma Delile*. African Journal of Biological Sciences, 14, 127-140.