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(RESEARCH ARTICLE)

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Medicinal Plants in Jarjar oma region, Al Jabal Al Akhdar area, Libya

Enas M. Saed [1, *], Abdelbaset M. Askar [2], Rabihah A. Mohammed [3], Hana Y. Omar [1], Ensaf H. Dakeel [1] and Mohamed A. Alaib [2]

[1] *Department of Botany, Faculty of Science, Omar Al Mukhtar University Al Baida, Libya.*
[2] *Botany Department, Faculty of Science, Benghazi University, Benghazi, Libya.*
[3] *Higher institute of science and Technology, Cyrene, Libya.*

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Abstract

Collecting wild medicinal plants is an ancient practice rooted in many societies, where they are collected for their medicinal and nutritional properties. Al Jabal Al Akhdar area has many regions with wealthy vegetation with folk medicine uses. Among these regions is The Jarjar Oma regions. Survey results indicate that there is a total of 78 species within the Jarjar Oma region, which within 70 genera distributed over 33 families. 1 family 1 species is classified as Gymnosperms, while 32 families are classified as Angiosperms. Among the Dicotyledons, which 67 species within 59 genera distributed over 26 families. while monocotyledons include 6 families, 10 genera, and 10 species. Obtained the highest dominance The Asteraceae family 19% species and followed by the Fabaceae family 13% species. As for the genera, the genus *Trifolium sp*. obtained the highest dominance. The active ingredient, flavonoid, was present in most of the recorded plant species, and followed by the Saponins.

Keywords: Medicinal Plants; Active Ingredient; Al Jabal Al Akhdar; Flavonoid; Saponins; Jarjar Oma; Asteraceae Family; Fabaceae Family

1. Introduction

Medicinal plants are becoming increasingly essential today due to their low cost, safety, and fewer side effects. They are also readily available and can be considered a primary source of health care for indigenous people living in poverty and rural areas, the World Health Organization seeks to integrate traditional medicine based on medicinal plants into health systems [1]. Medicinal plants are used in folk medicine throughout the world, and their active ingredients are used as a natural alternative to synthetic chemical treatments. Interest in them is growing in modern society with the increasing demand for natural treatments [2]. The active substances found in the parts of medicinal plants, such as alkaloids, flavonoids, and terpenes, are responsible for the medicinal effects of these plants [3]. The Al Jabal Al Akhdar area of Libya boasts exceptional plant diversity. This relatively small area, compared to the vast size of Libya, contains more than half of the country's plant species. The Al Jabal Al Akhdar area contains approximately 1,100 plant species, out of approximately 2,000 in Libya as a whole [4]. Medicinal plants are widely used in folk medicine in rural Libya, where they are considered a more economical option than modern medicine. This is due to their low cost, as they are often readily available and inexpensive, making them an affordable option [5] This study aims to provide researchers with information on medicinal plants and their active ingredients in the region, helping them make informed decisions about their use. This guide can serve as a valuable reference for researchers, healthcare professionals, and individuals interested in botanical medicine and natural remedies.

* Corresponding author: Enas M. Saed. E-mail: enas.saed@omu.edu.ly

2. Material and methods

2.1. Location Description

Jarjar oma region is located in Northeast of Libya, within located the Al Jabal Al Akhdar area. 28 km west Al Baida, between Latitude"49.8 ,47ó ,32ỏ N 2 and Longitude, "40.6 ,26ó ,21ỏ E. As showed Figure (1).

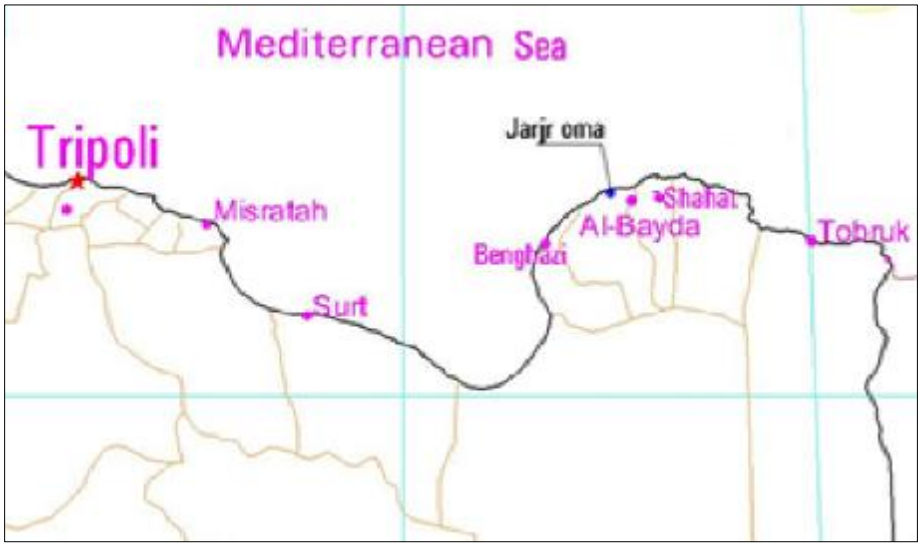

Figure 1 Map of the study area

2.2. Specimen Collection and Identification

Was collection the plant specimen from during 2010 and 2011 and it was identified by used the Flora of Libya Encyclopedia [6].

2.3. Review Methodology

It was by knowing the chemicals for Active ingredient, and part used for the plant medicinal through the use of electronic databases Google Scholar, and Researchgate. Also, some books on Libyan folk medicine were also used. [7]; [8]; [9]; [10].

3. Results

Overall count of medicinal plants in the research area about 78 species within the Jarjar Oma region, which within 70 genera distributed over 33 families. 1 family 1 species is classified as Gymnosperms, while 32 families are classified as Angiosperms. Among the Dicotyledons, which 67 species within 59 genera distributed over 26 families. while monocotyledons include 6 families, 10 genera, and 10 species. Obtained the highest dominance The Asteraceae family 19% with 15 species and followed by the Fabaceae family 13% with 10 species, The proportion of the family was Chenopodiaceae, Euphorbiaceae, Liliaceae and Polygonaceae 5% represented by 4 species, Apiaceae and Illecebraceae 4% for each family 3 species, Asclepidiaceae, Anacardiaceae, Brassicaceae, Geraniaceae, Lamiaceae and Poaceae two species for each family, Aizoaceae, Caesalpinaceae, Alliaceae, Amaryllidaceae, Convolvulaceae, Crassulaceae, Cupressaceae, Dipsacaceae, juncaceae, Gentianaceae, Malvaceae, Primulaceae, Papaveraceae, Plantaginaceae, Plumbaginaceae, Posidoniaceae, Rhamnaceae, Solanaceae and Urticaceae with 1 species for each family (Figure 2).

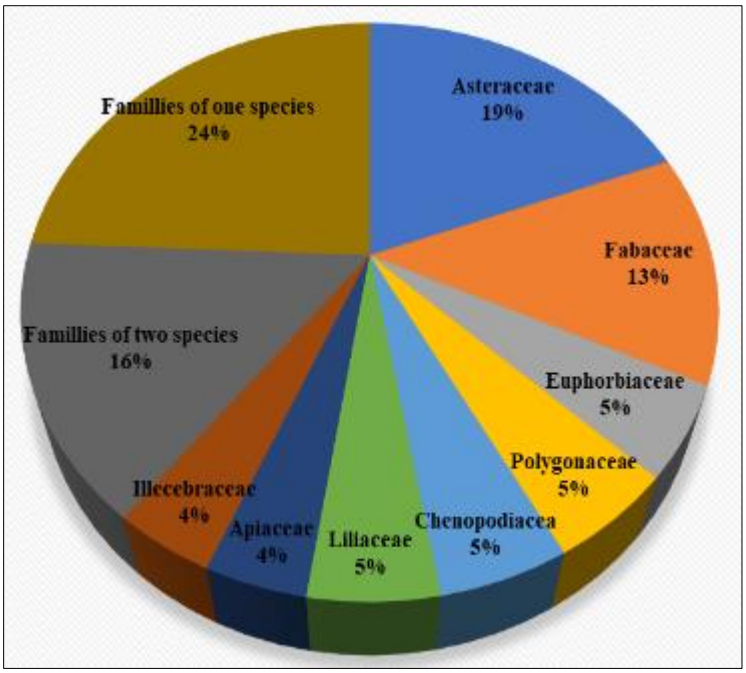

Figure 2 The percentage of medicinal plant in each family relative to total number of medicinal plant species in Jarjar oma area

As for the genera, the genus *Trifolium sp*. obtained the highest dominance, represented by 3 species, as for the genera that were represented by 2 species: *Cichorium sp.*, *Herniaria sp*., *Euphorbia sp*., *Trigonella sp.* and Polygonum, as for the remaining genera represented a 1 species. And at the active ingredient, flavonoid, was present in most of the recorded plant species, such as *Pancratium maritimum* L., *Ammi visnaga* (L.) Lam, *Asparagus stipularis* Forsk., *Cynara cornigera* Lindley., *Silybum marinum* (L.) Gaertner, *Chrozophora tinctoria* (L.) Juss., *Medicago polymorpha* L., *Trifolium tomentosum* L., *Vicia tetrasperma* (L.) Schreb*.,* and *Phragmites australis* (Cav.) Trin. ex Steud. And followed by the Saponins then became dominant, and some species that contain this substance include *Beta vulgaris* L., *Polygonum maritimum* L., *Anagallis arvensis* L., *Trigonella stellata* Forsk*., Senecio gallicus* Chiax. and *Allium roseum* L. (Table 1).

Table 1 The active ingredients, part used, scientific names and family of medicinal species documented in the study area

NO	Family	Scientific name	Part Used	Active ingredient	References
1.	Aizoaceae	*Mesembryanthemum nodiflorum* L.	Aerial Parts	Alkaloid, Dichloromethane, Cyclohexane and Methanolic	[11]
2.	Alliaceae	*Allium roseum* L.	The Leaves, Flowers, and Bulbs	Volatile oil, Saponins and Vitamins.	[8]
3.	Amaryllidaceae	*Pancratium maritimum* L.	Bulbs	Flavonoid, Rutin and Alkaloids.	[7]
4.	Anacardiaceae	*Pistacia lentiscus* L.	Inner Bark, Seed,Leavesand Fruits,	Leaves- Tannin. Fruits, volatile oil containing d-pinene has Balsamic odour. Inner bark, Mastic contains resin.	[7]
5.		*Rhus tripartita* (Ucria) Grande	Bark	Tannin	[8]
6.	Apiaceae	*Ammi visnaga* (L.) Lam	All parts of the plant, especially its fruit.	Polyphenolic Compounds Including Flavonoids, Essential Oil, and Pyrones,	[12]
7.		*Bupleurum lancifolium* Hornem	Leaves	Triterpenoid, Flavonoids, Echinocystic Acid, Oleanolic Acid and Saponins	[13]
8.		*Torilis leptophylla* (L.) Reichb	All parts of the plant	Alkaloids, Terpenoids, Anthraquinones, Glycosides and Phenolic.	[14]
9.	Asclepidiaceae	*Caralluma europaea* (Guss.) N.E.Br.	The Aerial Parts	Terpenoids, phenolic acids, And Flavonoids Compounds. and Essential Oil.	[15]
10.		*Periploca angustifolia* Labill.	Leaves	Phenolic and Flavonoids	[16]
11.	Asteraceae	*Anthemis secundiramea* Biv.	The essential oil from the aerial parts.	A. secundiramea (Z)-lyratyl acetate, (Z)-chrysanthenyl acetate, (Z)-chrysanthenol and (E)-chrysanthenyl acetate.	[17]
12.		*Calendula arvensis* L.	Whole Plant	Saponins, Sterols, Favonoids, Fatty Acids, Phenolics, Tannins, and Alkaloids.	[18]
13.		*Carduus getulus* Pomel	Whole plant	Phenolics, Tannins, Alkaloids, Flavonoids, Saponinsand	[19]

				Glucosides.	
14.		*Centaurea alexandrina* Delile.	Leaves, Flower, Root, and Stems.	Steroids, Fatty Acids Esters, Alcohols, Diterpenoids	[20]
15.		*Cichorium endivia* L.	Leaves	Lactucopicrin (Bitter principles)	[7]
16.		*C. spinosum* L.	Aerial parts	protein, antioxidants, phenols , minerals and linolenic acid.	[21]
17.		*Crepis vesicaria* ssp. *vesicaria* L.	Roots and Aerial Parts	Esquiterpenes and Flavonoids	[22]
18.		*Cynara cornigera* Lindley.	Fruits	Glycosides , Flavonoids and Triterpenes.	[23]
19.		*Lactuca saligna* L.	The Aerial Parts	phenolic compounds.	[24]
20.		*Matricaria aurea* (Loefl.) Sch. Bip.	Flower extracts	Coumarins, Phenols, Esters and Ketones.	[25]
21.		*Pallenis spinosa* (L.) Cass	Flowers and Leaves.	Phenolic compounds.	[26]
22.		*Phagnalon rupestre* (L.) Dc.	The aerial parts	Phenolic glycosides.	[27]
23.		*Senecio gallicus* Chiax.	The Capitula and Leaves Parts.	Saponins, Tannins, Phenols, Flavonoids and Alkaloids.	[28]
24.		*Silybum marinum* (L.) Gaertner	Herb and Fruits	Flavonoids, Silymarin, Silybin, Tannin, Resin, Bitter principles, Starch, Tyramine, Histamine, Fumaric acids.	[7]
25.		*Urospermum dalechampii* (L.) Scop. ex F.W. Schmidt	The aerial parts	Flavonoids and Condensed Tannins	[29]
26.	Brassicaceae	*Coronopus squamatus* (Forsk.) Ascherson	The aerial parts	Flavonoids, Glucosinolates, Sterol Glycosides, Saponins and Anthraquinones.	[30]
27.		*Sinapis alba* L.	Seeds	Sulphur, Glycosids sinabin, Protein, Fixed oil and Mucilage.	[7]
28.	Caesalpinaceae	*Ceratonia siliqua* L.	Fruit, Seeds and Bark.	Fruit (Sugers mannose and Galactose), Seeds (Carubin Carubinase and carubinose), Bark (Fixed oil and Tannin).	[7]

29.	Chenopodiaceae	*Beta vulgaris* L.	Root, Leaves, Seed.	Saponins, Vitamins, Betaine, Asparagin, Sugars, Raphanol, Glucuronide, Vanillin.	[7]
30.		*Chenopodium murale* L.	The plant except the roots.	Volatile oil, Amines, Proteins, fats, Carotene, Vitamin C and Chinnopodin alkaloid	[8]
31.		*Salsola kali* L.	The whole plant.	Alkaloids salsolidine, Oxalic acids, Oxalates, Protein, Fat and Minerals.	[7]
32.		*Suaeda vera* Forak. ex Gmel.	Leaves	Antioxidant, Flavonoids and Phenolics	[31]
33.	Convolvulaceae	*Cressa cretica* L.	The whole herb	N- octacosanol and Beta- sitosterol.	[7]
34.	Crassulaceae	*Sedum sediforme* (Jacq.) Pau	The whole herb	Phenolics compound	[32]
35.	Cupressaceae	*Juniperus phoenicea* L.	New Leaves - Cones (Fruits)	Phenolic compounds, Volatile oil, Guaiacol and Ethyl guaiacol, Cresol.	[8]
36.	Dipsacaceae	*Scabiosa arenaria* Forskal.	Fruits, Flowers, Leaves and Stems.	Polyphenol, Flavonoid, Tannin and Antioxidant.	[33]
37.	Euphorbiaceae	*Chrozophora tinctoria* (L.) Juss.	Flowering Branches	Flavonoids	[34]
38.		*Euphorbia paralias* L.	Methanolic Extract For P;Ant	Flavanols, Flavonoids, Fatty Acids, Phenolic Acids, Sterols and Terpenoids.	[35]
39.		*E. peplus* L.	Leaves	Latex, Resin, Saponins, Flavonoids in free form or as Glycosides, and Alkaloids	[7]
40.		*Mercurialis annua* L.	Herb	Volatile oil, Saponins, Bitter principles, Organic amines and Alkaloid murcurialine.	[7]

41.	Fabaceae	*Medicago polymorpha* L.	Fresh Leaves	Phenolic Compounds Phenolic Acid Glycosides and Flavonoids.	[36]
42.		*Ononis vaginalis* Vahl.	Root	Phenolic	[37]
43.		*Retama raetem* (Forsk.) Webb	The entire plant.	Colouring matters, Alkaloids and Fixed oil.	[7]
44.		*Trifolium purpureum* Lois.	Extracts obtained from plant	Flavonoids, Saponins, Clovamides and Phenolic Acids.	[38]
45.		*T. scabrum* L.		\\	\\
46.		*T. stellatum* L.		\\	\\
47.		*T. tomentosum* L.		\\	\\
48.		*Trigonella maritima* Del. ex Poir.	Leaves	Saponins, Flavonoids and Pterocarpans	[39]
49.		*T.stellata* Forsk.	Leaves	Saponins, Flavonoids and Pterocarpans	[39]
50.		*Vicia tetrasperma* (L.) Schreb.	Young Leaves and Shoots	Flavonoid glycoside	[40]
51.	Gentianaceae	*Centaurium pulchellum* (Swartz) Druce	Aerial parts	Secoiridoid glycosides	[41]
52.	Geraniaceae	*Erodium moschatum* (L.) L'Herit.	The entire plant	Phenolic compounds, Essential oils and Alkaloids.	[42]
53.		*Geranium molle* L.	Extracts from the plant	Carbohydrate, Proteins, Essential Fatty acids. Phenolic Compounds and Antioxidant	[43]
54.	Illecebraceae	*Herniaria cinerea* Dc.	The Entire Plant	Flavonoid, Pigments, Saponin and Alkaloid.	[7]
55.		*H. glabra* Linn.	Whole Plant	Glycosides and Saponin.	[44]
56.		*Paronychia arabica* (Linn.) Dc.	The aerial parts	Oxetane Containing Lignans, Phenolic Compounds and Steroid Glycoside.	[45]
57.	Juncaceae	*Juncus acutus* L.	Leaves and Roots	Phenolic Compounds	[46]
58.	Lamiaceae	*Phlomis floccosa* D. Don	Essential oil of plant	Phenols, Flavonoids, Tannins, Alkaloidsand Saponins	[47]
59.		*Prasium majus* L.	The powder of plant dried	Polyphenol, Flavonoid and Tannin	[84]

60.	Liliaceae	*Asphodelus microcarpus* Salzm. andViv.	Bullbs and Seeds.	Anthraquinones, Glycoside and Alkaloids.	[7]
61.		*Asparagus stipularis* Forsk.	Ground Part	Steroidal Glycosides, Triterpenoid and Saponins.	[49]
62.		*Urginea maritima* (L.) Baker.	Bulb	Phenolic Acids, Flavonoids and Coumarins.	[50]
63.		*Scilla peruviana* L.	Bulb	Glycosides.	[51]
64.	Malvaceae	*Malva parviflora* L.	The entire plant	Gelatinous substances, Astringents and Mineral salts	[9]
65.	Primulaceae	*Anagallis arvensis* L.	Whole herb.	Acrid volatile oil, Enzymes, Saponins, Tanins and Bitter principles.	[7]
66.	Papaveraceae	*Glaucium flavum* Crantz.	Root	Alkaloids	[7]
67.	Plantaginaceae	*Plantago ovata* Forskal.	Seed	Fixed oil, albuminous matter, Mucilage, Tannin, Glycoside, Sugars and Sterols.	[7]
68.	Plumbaginaceae	*Limoniastrum monopetalum* (L.) Boiss	The aerial parts	Flavonoid compounds	[52]
69.	Poaceae	*Cynodon dactylon* (L.) Pers.	The entire plant and its juice	Saponin, Hadrocynic Acid, Proteins, Carbohydrates, Flavanoids, Alkaloids, Glycosides and Triterpenoids	[53]
70.		*Phragmites australis* (Cav.) Trin. ex Steud.	Leaves	Flavonoid glycosides	[54]
71.	Polygonaceae	*Emex spinosus* (L.) Camped	Leaves	Flavonoid	[55]
72.		*Polygonum equisetiforme* Sm.	The whole plant	Phenolic Glycosides, Triterpenoids, Flavonids, insulin-like substances.	[7]
73.		*P. maritimum* L.	The whole plant	Avicularin glycoside, Gallic acid, Polygonic acid Saponins and flavonoids	[10]

74.		*Rumex crispus* L.	The whole plant	Anthraquinone, Voatile oil, Resin, Tannin, Rumicin, Sulpher, Iron, Thiamine and Chrysophanic aced	[7]
75.	Posidoniaceae	*Posidonia oceanica* (L.) Delile	Leaves	Chicoric acid, phenolic and flavonoids	[56]
76.	Rhamnaceae	*Ziziphus lotus* (L.) Lam.	Bark, Fruits and Roots.	Flavon and Emodin.	[3]
77.	Solanaceae	*Lycium europaeum* L.	The whole plant	Alkaloids, Terpenoids, Flavonoids, Phenolic Acids, Fatty Acids, Polysaccharides, Carotenoids, Tocopherols and Sterols.	[57]
78.	Urticaceae	*Urtica urens* L.	The whole plant	Histaminic compound, Formic acid, Tannin, Silicon, mineral salts, Glucoquinines, Vitamins AandC.	[9]

4. Discussion

Al-Jabal Al-Akhdar area is of great importance in Libya, as it is a natural habitat rich in biodiversity and plant resources of medicinal and environmental value. This is due to its unique geographical location, as it includes a large number of species used for traditional medicine. These plants include many medicinal species that are used to treat a wide range of diseases [58]. The Jarjar oma region is part of Al-Jabal Al-Akhdar area, and the results of a study conducted in this area revealed a rich biodiversity of medicinal plants. A significant number of 78 species were recorded, belonging to 70 genera and 33 families. These results indicate the importance of the Jarjar oma region as a natural habitat rich in plant resources, and highlight the need for further studies and research to protect these resources and enhance their utilization. The results show the dominance of both the Asteraceae and Fabaceae families. These results are consistent with scattered areas in Al-Jabal Al-Akhdar area, such as [59] in the Shahat region and [58], in the Wadi Al-Kuf region, as these families are considered among the largest families in Flora of Libya Encyclopedia. [6]. The Asteraceae family is widely distributed throughout the world, and many of its species possess various pharmacological activities due to their rich phytochemical constituents, which contain active substances such as essential oils, saponins, phenolic acids, sterols, and polysaccharides. Plants in this family used historically in folk medicine [60]. The Fabaceae family is one of the most beneficial plant families to humans, used in a wide range of applications, including food, feed, and fertilizers. It also contributes to the production of numerous natural products of economic and medicinal value. The importance of this family is highlighted by its use as food rather than medicine, but numerous studies have proven the existence of active ingredients and their medicinal uses. Phytochemical studies have revealed the presence of isoflavones, flavonols, saponins, glucosides, rutinoids, chalcones, and alkaloids. Flavonoids are among the most important components of the legume family. In traditional medicine, many parts of plants in the Fabaceae family are considered responsible and beneficial in the treatment of various diseases. Laboratory research has demonstrated the medicinal effects of the legume family on various body systems [61]. The genus *Trifolium sp*. has the largest number of species, as it is characterized by the diversity of its chemical components and its wide distribution. It has been known for many centuries as an important plant and herb that holds value in folk medicine [38]. The most active substances present in the plant species were flavonoids and saponins. This is because the study area is coastal, and the plant species located in those areas have developed mechanisms to adapt to harsh environmental conditions such as high temperature and salinity. One of these mechanisms is the synthesis of flavonoid compounds [62]. The results of the study [63] also proved that saponins are the highest in response to stress, which supports the presence of saponins in most plant species in the study area.

5. Conclusion

Considered Al-Jabal Al-Akhdar area of great importance due to its rich biodiversity and medicinal plants used in traditional medicine. A study conducted at Jarjar oma region recorded 78 species of medicinal plants, 70 genera within 34 families, with the (Asteraceae and Fabaceae) families dominating. As for the genera, the genus *Trifolium sp*. And at the active ingredient dominating (flavonoid and Saponins). These results demonstrate the importance of the region as a natural habitat rich in plants and highlight the need for further studies to protect and promote the use of these resources.

Recommendations

Conserve plant resources by taking measures to preserve medicinal plants in the region, such as setting harvesting seasons and preventing overharvesting. Also, collaborate with local communities to share knowledge about medicinal plants and their uses.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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