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The Genus Asphodelus in Palestine: Review of Traditional uses, Phytochemistry and Biological Activities.

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ABSTRACT
This study aims to shed light on the species of the Asphodelus genus, belonging to the Asphodelaceae family, widespread in Palestine, in terms of chemical composition, popular traditional medicinal uses, and therapeutic medical effects .
Studies have shown that there are four species widespread in Palestine :
(Asphodelus aestivus, Asphodelus ramosus, Asphodelus microcarpus, Asphodelus fistulosus).
Species of the genus Asphodelus have been used in traditional folk medicine in many countries of the world to treat: hemorrhoids, burns, wounds, kidney disease, stomach ulcers, skin diseases, and infections associated with fungi, diuretic, anti-tumor, in some cases of paralysis, and infections. Microbiological, psoriasis, jaundice, external skin parasites, rheumatism, colds, eczema and ear pain.
Asphodelus species contain many active substances in all parts of the plant, such as flavonoids, anthraquinones, amino acids, phenolic acids, fatty acids, triterpenoids, carbohydrates, gum, and esters.
Recent studies have proven that some species of the genus (Asphodelus) have a group of therapeutic medicinal effects such as antioxidant, antifungal, cytotoxic, anti-inflammatory, programmed cell death, antimicrobial, anti-melanin, antiviral, antihypertensive, diuretic, antifungal. Antiparasitic, antimalarial and other effects.
In conclusion, it was concluded that the Asphodelus plant was used in the past in traditional folk medicine to treat a group of diseases. Recently, studies and research have proven that some of its various extracts have various medical and therapeutic effects and have great hope for their use in the production of medicines in the future.
Keywords: The Genus Asphodelus,Palestine, traditional uses, phytochemistry, Biological Activities.

I. INTRODUCTION

Herbal remedies and medicinal plants are of therapeutic importance as they provide effective treatment for a wide range of diseases. Research indicates that people in rural areas generally prefer it to synthetic drugs to treat a variety of diseases, unlike people in urban areas who prefer synthetic drugs.

Carl Linnaeus initially named the Asphodelus genus, in 1753, which is mostly composed of perennial flowering plants, in the Asphodelaceae family (1, 2). The genus was once a member of the familyLiliaceae (2). The genus is indigenous to the Mediterranean, Africa, the Middle East, the Indian Subcontinent, and temperate Europe (3, 4). A few species have also been brought to and are now naturalized in other regions, including New Zealand, Australia, Mexico, and the southwestern United States(1).

Asphodelus is a genus of about 20 species in the Asphodelaceae family. They are native to Europe, North Africa, and Asia, but primarily the Mediterranean (1).

Studies have shown that there are four species widespread in Palestine: (Asphodelus aestivus Brot.Asphodelus microcarpusViv. Asphodelus ramosus L., Asphodelus fistulosus L.) (3, 5, 6).

Asphodelus species include various active chemicals in all portions of the plant, such as flavonoids, anthraquinones, amino acids, phenolic acids, fatty acids, triterpenoids, polysaccharides, gum, and esters(1, 3, 7, 8).

Asphodelus species have been used in traditional folk medicine for many years to cure a variety of conditions, including infections, burns, wounds, renal illness, stomach ulcers, skin problems, and fungal infections (1). They have also been used as a diuretic, anti-tumor, and in rare circumstances, to treat paralysis (1, 3). Infections by microbes, psoriasis, and jaundice, parasites on

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the skin, rheumatism, colds, eczema, and ear ache (1, 3, 8).

Recent research has demonstrated that a number of Asphodelus species has a range of beneficial medical properties, including antifungal, cytotoxic, anti-inflammatory, antibacterial, anti-melanin, antiviral, antihypertensive, diuretic, antioxidant properties,antiparasitic, antimalarial, and other (1,3,8-10).

With only four species, the Asphodelaceae family is one of the smallest in the Palestine region. Some species stand out due to their therapeutic properties and distinct natural compounds, which contain interesting subunits and structures(5،6) .

It is interesting that review research on these four species widespread in Palestine, or their chemical or medicinal properties, or even their use in ethnobotany and ethno medicine is very limited and almost non-existent.

The purpose of this study is to provide more information on the chemical makeup, traditional medicinal applications, and therapeutic benefits of the Asphodelus genus of plants, which are widely distributed in Palestine and belong to the Asphodelaceae family.

We shall discuss their documented therapeutic properties as well as the findings from analyses of their chemical structures in this review paper .

The data will be displayed in easy-to-understand tables. In addition to talking about some topics related to chemical composition and traditional and medical uses. Finally, recommendations and future directions will be discussed along with conclusions.

There is a lot of literature that talks about the (Asphodelus) in terms of its chemical composition, its use in folk medicine, and its various medical effects, the most famous of which is (1,3,8) However, our study differs from previous studies in several points :

1 -Our study is distinguished by adding new information about the Asphodelus species widespread in Palestine in terms of their chemical composition, and their uses in traditional folk medicine.
2 -It is distinguished by the addition of recent studies on the medical and therapeutic effects of the Asphodelus
3 -It is distinguished by the addition of modern references.
In the end, we say that this study, along with other studies, will complement each other in order to reach knowledge and work to disseminate information globally.

II. MATERIALS AND METHODS

Using the search term Asphodelus, relevant data were found in the scientific databases (Scopus, Google Scholar, Web of Science, PubMed, and Science Direct),published books and master's theses (from 2000 until 2024) .During the literature search, a number of keywords were used, such as Asphodelus, Genus Asphodelus, species Asphodelus, Asphodelus in Palestine, biological activities, isolated compounds phytochemistry and traditional use. Data were collected and summarized in tabular form.

III. RESULTS AND DISCUSSION

The present review gathered information from numerous research articles that unequivocally showed the significance of Asphodelus species, which is widely distributed in Palestine, in traditional folk medicine in many other countries of the world for treating a wide range of illnesses, including: fungus-related infections, skin diseases, ulcers, burns, kidney disease, rheumatism, colds, eczema, and some cases of paralysis; microbiological infections; psoriasis; jaundice; external skin parasites; psoriasis; and infections related to fungi, diuretic, and anti-tumor. Table 1.

The review described the investigations carried out to ascertain the chemical composition of the species in question. It was discovered that a multitude of active substances were present in all parts of the species, with flavonoids, anthraquinones, amino acids, phenolic acid, fatty acids, triterpenoids, carbohydrates, gum, and ester being the most significant. Table 2.

An overview of recent research was given in the review, which showed that Asphodelus species have a variety of beneficial medical effects. These include antiviral, antihypertensive, diuretic, antioxidant, antifungal, cytotoxic, anti-inflammatory, apoptotic, antimicrobial, and antimalarial properties. Table 3.

3.1 Traditional Folk Uses of the Four Asphodelus Species

Our review of the literature revealed a dearth of published research on the traditional folk usage of the Asphodeline genus in Palestine, as well as an unknown chemical makeup.

Twenty species make up the genus Asphodelus L. (Asphodelaceae), which is found across the Mediterranean basin. It has long been

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used to cure a number of illnesses, especially those related to skin conditions that are infectious and inflammatory in Cyprus, Egypt, Libya, Palestine, and Spain (1).

Asphodelus species have been used in traditional folk medicine for many years to cure a variety of conditions, including infections, burns, wounds, renal illness, stomach ulcers, skin problems, and fungal infections (1,8). They have also been used as a diuretic, anti-tumor, and in rare circumstances, to treat paralysis. Infections by microbes, psoriasis, jaundice, parasites on the skin, rheumatism, colds, eczema, and ear ache in Egypt, India, Pakistan, and Turkey (1,3,8).

Summary of the published literature about the traditional usesof these plants is presented in Table 1.

Table 1. Traditional uses of the Asphodelus species

N_0	Diseases and traditional folk uses	Asphodelus species	References
1	Gastrointestinal diseases and disorders: stomach ulcers, Hemorrhoids Laxative, anthelmintic and totreat stomachache.	A. aestivus A. ramosus A. fistulosus	11-16
2	Skin diseases: burns, wounds, psoriasis Eczema,dermatomucosal,Skin conditions	A. aestivus A. microcarpus A. ramosusis A. fistulosus	12,14,15 ,17-23
3	Urinary system diseases:Nephritis, diuretic.	A. aestivus A. ramosus A. fistulosus	1,12,24
4	Respiratory system diseases :Colds	A. microcarpus A. ramosusis	22,23
5	Diseases of the skeletal and muscular system : rheumatism, and paralysis, arthritis	A. Microcarpus A. ramosus	1,22,25, 26
6	Parasites: Ectodermal parasites	A. microcarpus	19-21
7	Fungal diseases: Fungal infections	A. fistulosus	1
8	Inflammatory diseases: microbiological infections, ear pain	A. microcarpus A. ramosus A. fistulosus	1,19- ,22,24
9	Cancer diseases:antitumor.	A. ramosus A.fistulosus	1,24
10	Liver diseases: jaundice	A. microcarpus	19-21

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11	Antispasmodic and analgesic.	A. fistulosus A. microcarpus	25,27,28
12	Ovulation.	A. microcarpus	25
13	Antiseptic.	A. ramosus	29
14	Increase lactation in sheep.	A. ramosus	30
15	Hemorrhoids and acne.	A. ramosus	13
16	Food	A.fistulosusis A. microcarpus	31,32
17	Obesity	A. ramosusis	23
18	Diabetes.	A.ramosusis	33

3.2. Phytochemical Studiesof the of the Four Asphodelus Species

Studies on phytochemistry, as indicated in Table 2, revealed the existence of many groupings of chemicals (7) .They are triterpenoids, flavonoids, phenolic acids, and Anthraquinones(1,3).

The aerial portions generally revealed the presence of flavonoids, phenolic acids, and a little amount of anthraquinone, while the roots were mostly reported to contain derivatives of naphthalene and anthraquinone. Roots and seeds both contain fatty acids (1, 3, 7, and 8).

Table No. 2 summarizes theresults of phytochemical studies of some research conducted on (Asphodelus) species and mentioned in the literature.

Table 2. Phytochemical Studies of the Asphodelus species

N_0	Class of Compounds	Asphodelus species	References
1	Anthraquinones	A. aestivus , A. fistulosus A. microcarpus, A. ramosus	1, ,21,34-36
2	Flavonoids	A. aestivus, A. fistulosus A. ramosus	1,27,33,34,37,38
3	Phenolic acids	A. aestivus, A. ramosus	34,37,38
4	Amino acids	A. aestivus	34
5	Fatty acids	A. aestivus, A. fistulosus A. microcarpus	1,25, 39
6	Carbohydrates	A. fistulosus, A.microcarpus	1,40
7	Triterpenoids	A. fistulosus, A. microcarpus	1
8	Alkenes	A. aestivus	34

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3.3. Biological Activitiesof the Four Asphodelus Species

Medicinal plants are considered an important economic resource of natural biodiversity. Certain medicinal plants, like the Asphodelus species, which are common in Palestine and contain a range of chemical components that are biologically active and have been used in traditional medicine to treat various ailments, can be appropriately employed to manufacture essential drugs .

These biological effects must be thoroughly investigated for a range of disorders before they can be utilized in medication development.

Table No. 3 summarizes the therapeutic medical effects of some of the results of studies and pharmaceutical research conducted on (Asphodelus) species and mentioned in the literature.

Table 3. Summary of biological studies reported from the Asphodelus genus.

N_0	Biological activities	Asphodelus species	Ref
1.	Antioxidant activity	A.aestivus, A.microcarpus A.ramosus, A. fistulosus	12,38, 41-51
2.	Anti-fungal activity	A.aestivus, A.microcarpus A.ramosus , A. fistulosus	11,18, 41-43, 51-53
3.	Cytotoxic activity	A.aestivus A.microcarpus	42,45, 54-56
4.	Anti-inflammatory,	A. aestivus ,A. ramosus, A. fistulosus	1,11,51
5.	Antimicrobial activity	A. aestivus, A. fistulosus, A.microcarpus, A.ramosus	1,20,25,48,51,53,55-68
7.	Antimelanogenic activity	A.microcarpus	44
8.	Antiviral activity	A.microcarpus, A. ramosus, A. fistulosus	51,55,56,67,69,70
	Allopathic activity	A. ramosus	71
	Analgesic	A. ramosus	72
	Ant allergy	A. ramosus	73
	Anti-acne activity	A. ramosus	74
	Anti-cancer	A. ramosus	49,61
	Anti-leukemia	A. ramosus	53
	Anti-malarial activity	A. ramosus	53
	Anti-leishmanial activity	A. ramosus	53
	Hypotensive	A. fistulosus	75
	Vasorelaxant	A. fistulosus	75
	Anti-diarrheal	A. fistulosus	76
	laxative	A. fistulosus	76

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	Diuretic	A. fistulosus	75
	Anti-parasitic	A. fistulosus	51
	Insecticidal	A. fistulosus	77

The only natural resource available for creating safe, efficient, and superior medications is medicinal plants. As a result, raising public knowledge of the phytochemicals found in Palestinian plants and the necessity for more scientific study are seen as national priorities as they will aid in the development of safe medications that will aid in future recovery and treatment of illnesses.

Although more chemical and clinical testing, as well as research into the safety of utilizing these plants, are needed, this review may give researchers the chance to use this wealth of data to investigate novel agents to treat a variety of illnesses and aid in the discovery of new applications for medicinal herbs.

IV. CONCLUSIONS

The study presents the results of various studies collected on the chemical composition, traditional medicinal applications, and therapeutic benefits of four common species in Palestine: Asphodelus aestivus, Asphodelus ramosus, Asphodelus microcarpus, and Asphodelus fistulosus.

The results of our current study presents that Asphodelus species have been used in traditional folk medicine for many years to cure a variety of conditions, including infections, burns, wounds, renal illness, stomach ulcers, skin problems, and fungal infections. They have also been used as a diuretic, anti-tumor, and in rare circumstances, to treat paralysis. Infections by microbes, psoriasis, jaundice, parasites on the skin, rheumatism, colds, eczema, and ear ache.

Several active ingredients, including flavonoids, anthraquinones, amino acids, phenolic acids, fatty acids, triterpenoids, polysaccharides, gum, and esters, are present in all portions of the Asphodelus species plant.

The study presents the results of recent research, whichhas demonstrated that a number of Asphodelus species has a range of beneficial medical properties, including antifungal, cytotoxic, anti-inflammatory, antibacterial, anti-melanin, antiviral, antihypertensive, diuretic, and antioxidant properties. Effects that are anti-parasitic, antimalarial, and other.

The review also addresses thatthe asphodelus plant was historically employed in traditional folk medicine to cure a variety of illnesses, it was concluded. Studies and research conducted recently have demonstrated that some of its many extracts have a variety of therapeutic and medicinal benefits, and there is tremendous optimism that these extracts will be used in the future to produce pharmaceuticals.

V. FUTURE VISION

1 .The four species of the genus (Asphodelus) widespread in Palestine have not been adequately studied.
2 .The properties and chemical compositions of these species must be studied.
3 .Plants of this family have traditional folk uses around the world.
4 .The biological activities of these wonderful plants have been little studied.
5. Extensive research is needed to uncover the pharmacological and chemical properties of these plants, as well as to discover the unique natural biological activities of the products contained in these plants.

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