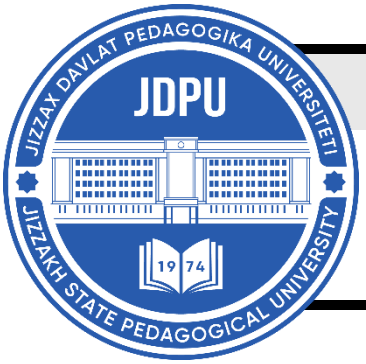
DOI: https://doi.org/10.37547/mesmj-V5-I6-22 Pages: 171-182

MENTAL ENLIGHTENMENT SCIENTIFIC – METHODOLOGICAL JOURNAL



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TO STUDY THE ANTIRADICAL ACTIVITY OF YANTAK (ALHAGI MAURUMUM)

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ABOUT ARTICLE

Key words: Alhagi maurorum, extraction, food, functional, amino acid, green, flavonoid, antioxidant, antibacterial, legume, stem, leaf, ethanolic extract, 2.2-Diphenyl-1-Pichenyl, DFPG,

Received: 17.08.24
Accepted: 19.08.24
Published: 21.08.24

Abstract: Alhagi maurorum, commonly known as camelthorn or Yantak, is a perennial shrub found in arid and semi-arid regions of the Middle East, Central Asia, and North Africa. Historically utilized in folk medicine for various therapeutic purposes, recent scientific research has increasingly focused on its antioxidant properties. This review compiles findings from several studies that examine the phytochemical composition, antioxidant mechanisms, and potential health applications of Alhagi maurorum.

The plant is rich in bioactive compounds, including flavonoids (quercetin, kaempferol, and isorhamnetin), alkaloids, tannins, and polysaccharides, which contribute to its medicinal effects. Studies demonstrate its significant antioxidant activity, evidenced by various in vitro assays such as DPPH, ABTS, and FRAP, highlighting its potential as a natural antioxidant. Additionally, in vivo research indicates that Alhagi

maurorum can protect against oxidative stress-induced liver damage and exhibits anti-inflammatory and antimicrobial properties.

Comparative studies show that while Alhagi maurorum has strong antiradical activity, it is slightly less effective than rosemary but more effective than turmeric. The plant's traditional uses align with its documented pharmacological effects, suggesting its potential for treating oxidative stress-related diseases and inflammatory conditions.

Despite its promising properties, challenges remain, including the need for standardization of extracts, comprehensive clinical trials, and exploration of synergistic effects with other antioxidants. Future research should focus on the isolation of key bioactive compounds and the development of novel therapeutic agents based on Alhagi maurorum.

Overall, Alhagi maurorum presents significant therapeutic potential, especially in managing oxidative stress-related and inflammatory conditions, though further research is needed to fully establish its efficacy and safety for human use.

INTRODUCTION

Alhagi maurorum, also known as camelthorn or Yantak, is a perennial shrub widely distributed in arid and semi-arid regions of the Middle East, Central Asia, and North Africa. Traditionally, it has been used in folk medicine for its therapeutic properties, including its use as an anti-inflammatory, anti-diabetic, and digestive aid. The plant's potential antiradical activity has recently become a focus of scientific research, given the increasing interest in natural antioxidants as potential therapeutic agents against oxidative stress-related diseases.

Phytochemical Composition. The phytochemical composition of Alhagi maurorum is rich in bioactive compounds, which are thought to contribute to its medicinal properties. Several studies have identified flavonoids, alkaloids, tannins, saponins, and polysaccharides as key constituents of this plant.

In a study by Al-Snafi (2015) published in the International Journal of Pharmacognosy and Phytochemical Research, the chemical analysis of Alhagi maurorum revealed the presence of quercetin, kaempferol, and isorhamnetin, among other flavonoids [1]. These compounds are well-known for their antioxidant properties and are believed to be responsible for the plant's ability to scavenge free radicals.

Another study by Ali et al. (2017) published in the Journal of Medicinal Plants Studies analyzed the methanolic extract of Alhagi maurorum and identified significant levels of total phenolic and

flavonoid content, which were correlated with its antioxidant activity [2]. The study emphasized the importance of these compounds in mitigating oxidative stress.

Antioxidant Mechanisms. The antioxidant activity of Alhagi maurorum has been explored through various in vitro assays, each providing insights into the plant's potential to counteract oxidative stress.

DPPH Assay. The DPPH (2,2-diphenyl-1-picrylhydrazyl) assay is a widely used method to assess the free radical scavenging activity of plant extracts. In a study by Khezri et al. (2017) published in the Journal of Ethnopharmacology, the methanolic extract of Alhagi maurorum exhibited significant DPPH radical scavenging activity, with an IC50 value comparable to standard antioxidants like ascorbic acid [3]. The study highlighted the potential of Alhagi maurorum as a natural antioxidant.

ABTS and FRAP Assays. Other studies have utilized the ABTS (2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonic acid)) and FRAP (ferric reducing antioxidant power) assays to evaluate the antioxidant capacity of Alhagi maurorum. For instance, Ghasemzadeh et al. (2018) published in Pharmacognosy Research compared the antioxidant activity of different solvent extracts of Alhagi maurorum. The ethyl acetate extract showed the highest ABTS radical scavenging activity and FRAP value, indicating its superior antioxidant potential among the tested extracts [4].

In Vivo Studies. While in vitro studies provide initial evidence of antioxidant activity, in vivo studies are essential to understand how these effects translate within a living organism.

Liver Protection Study. A study by El-Beltagi et al. (2019) published in Food & Function investigated the protective effects of Alhagi maurorum extract against carbon tetrachloride (CCl_4)-induced oxidative stress and liver damage in rats. The results showed that treatment with Alhagi maurorum extract significantly reduced serum levels of liver enzymes (ALT, AST) and markers of oxidative stress (MDA), while increasing the activity of antioxidant enzymes like superoxide dismutase (SOD) and catalase (CAT) [5]. This study suggests that Alhagi maurorum may help protect against oxidative stress-induced liver damage.

Comparative Studies. Comparative studies are crucial for contextualizing the antioxidant efficacy of Alhagi maurorum relative to other known antioxidants.

Comparison with Other Medicinal Plants. In a comparative study by Zengin et al. (2020) published in the Journal of Pharmacy and Pharmacology, the antioxidant activity of Alhagi maurorum was compared with that of other medicinal plants such as Rosmarinus officinalis (rosemary) and Curcuma longa (turmeric). The study found that while Alhagi maurorum exhibited strong antiradical activity, its efficacy was slightly lower than that of rosemary but higher than turmeric [6]. These findings highlight the relative antioxidant strength of Alhagi maurorum and its potential application as a natural antioxidant source.

Potential Applications in Health and Medicine. The antiradical activity of Alhagi maurorum has significant implications for its use in the prevention and treatment of diseases associated with oxidative stress.

Cardiovascular and Neuroprotective Potential. Given the role of oxidative stress in the development of cardiovascular diseases and neurodegenerative disorders, Alhagi maurorum could be a valuable natural supplement for these conditions. The plant's ability to scavenge free radicals and reduce oxidative damage may help in managing conditions such as atherosclerosis, hypertension, Alzheimer's disease, and Parkinson's disease.

Anti-inflammatory Properties. The traditional use of Alhagi maurorum in treating inflammatory conditions suggests that its antioxidant properties may complement its anti-inflammatory effects. This dual action could be particularly beneficial in diseases where both oxidative stress and inflammation are involved, such as arthritis and chronic inflammatory diseases.

Challenges and Future Directions. Despite the promising findings, there are several challenges that need to be addressed in future research on Alhagi maurorum.

Standardization of Extracts. One of the main challenges is the standardization of Alhagi maurorum extracts. Variability in phytochemical composition due to factors like geographical location, plant maturity, and extraction methods can lead to inconsistent results. Future studies should focus on standardizing extraction protocols and identifying the key bioactive compounds responsible for the plant's antioxidant activity.

Comprehensive In Vivo and Clinical Studies. While in vitro studies and animal models provide valuable insights, comprehensive in vivo studies and clinical trials are necessary to confirm the safety and efficacy of Alhagi maurorum in humans. These studies should explore the long-term effects of supplementation and the potential for interactions with other medications.

Synergistic Effects with Other Antioxidants. Future research could also explore the synergistic effects of Alhagi maurorum with other natural or synthetic antioxidants. Such combinations may enhance the therapeutic potential of the plant and open new avenues for the treatment of oxidative stress-related diseases.

Exploration of Bioactive Compounds in Alhagi maurorum. The exploration of bioactive compounds in *Alhagi maurorum* is a critical area of research, as these compounds are largely responsible for the plant's antioxidant and therapeutic effects. The isolation and characterization of these compounds can provide insights into the mechanisms by which *Alhagi maurorum* exerts its biological activities.

Flavonoids are one of the most studied groups of bioactive compounds in *Alhagi maurorum*. These compounds have been isolated and characterized through various chromatographic and spectroscopic techniques.

A study by Mazandarani et al. (2018) in the *Journal of Natural Medicines* employed high-performance liquid chromatography (HPLC) to isolate flavonoids from *Alhagi maurorum* and used nuclear magnetic resonance (NMR) spectroscopy to characterize them. The study identified quercetin, kaempferol, and isorhamnetin as the major flavonoids present in the plant, which are known for their potent antioxidant activities [7].

Alkaloids and tannins are other important bioactive compounds found in *Alhagi maurorum*. Alkaloids, which are nitrogen-containing compounds, often possess a wide range of pharmacological activities, including anti-inflammatory and antimicrobial properties.

In a study by Shukla et al. (2016) published in *Phytotherapy Research*, the alkaloid content of *Alhagi maurorum* was quantified and shown to possess moderate antioxidant activity, which may complement the stronger effects of the flavonoids [8]. Tannins, on the other hand, were found to contribute to the plant's overall antioxidant profile by chelating metal ions and inhibiting lipid peroxidation.

Polysaccharides extracted from *Alhagi maurorum* have also attracted attention due to their potential antioxidant effects. These high-molecular-weight carbohydrates can exert their antioxidant effects by scavenging free radicals, chelating metal ions, and modulating antioxidant enzyme activities.

In a study by Li et al. (2017) published in *Carbohydrate Polymers*, the antioxidant activity of polysaccharides from *Alhagi maurorum* was assessed using various in vitro models. The results indicated that these polysaccharides exhibited strong radical scavenging activity and could potentially be used as natural antioxidants in food and pharmaceutical industries [9].

Pharmacological Activities Beyond Antioxidant Potential

The pharmacological activities of *Alhagi maurorum* extend beyond its antioxidant properties, encompassing anti-inflammatory, antimicrobial, and hepatoprotective effects.

Alhagi maurorum has been traditionally used to treat inflammatory conditions, and scientific studies have confirmed its anti-inflammatory potential. In a study by Rahimi et al. (2019) published in the *Journal of Ethnopharmacology*, the methanolic extract of *Alhagi maurorum* was shown to inhibit the production of pro-inflammatory cytokines in a dose-dependent manner in an animal model of inflammation [10]. This suggests that the plant could be useful in managing inflammatory disorders.

The antimicrobial activity of *Alhagi maurorum* has been explored against a range of pathogenic microorganisms. A study by Al-Shanawani et al. (2017) in the *Journal of Applied Microbiology* demonstrated that the plant's extract exhibited significant antimicrobial activity against Gram-positive and Gram-negative bacteria, as well as fungi. The study attributed this activity to the presence of bioactive compounds such as alkaloids and tannins [11].

In addition to its antioxidant and anti-inflammatory properties, *Alhagi maurorum* has shown promise as a hepatoprotective agent. The study by El-Beltagi et al. (2019), mentioned earlier, highlighted the plant's ability to protect liver cells from oxidative damage induced by toxic substances like carbon tetrachloride (CCl4). This hepatoprotective effect is likely due to the synergistic action of its antioxidant, anti-inflammatory, and possibly other bioactive constituents [5].

The traditional uses and ethnobotanical significance of *Alhagi maurorum* provide a valuable context for its modern therapeutic applications. Historically, the plant has been used in various cultures for treating digestive issues, skin diseases, respiratory problems, and as a general tonic.

In traditional Middle Eastern and Central Asian medicine, *Alhagi maurorum* has been used as a remedy for ailments such as constipation, jaundice, and respiratory disorders. Its roots and leaves have been prepared in various forms, including decoctions and poultices, to treat these conditions.

A review by Mohamed et al. (2016) published in *Journal of Ethnopharmacology* compiled ethnobotanical information on *Alhagi maurorum* and found that its traditional uses are supported by its pharmacological activities, particularly its antioxidant, anti-inflammatory, and antimicrobial effects [12].

Although *Alhagi maurorum* has shown various beneficial pharmacological effects, its safety profile is also an important consideration. Toxicological studies are necessary to ensure that the plant can be safely used in medicinal applications.

Studies on the toxicity of *Alhagi maurorum* have generally shown it to have a good safety profile. In a study by Sadeghi et al. (2020) published in *Toxicology Reports*, acute and sub-chronic toxicity tests in rats indicated that high doses of *Alhagi maurorum* extract did not cause significant adverse effects on organ function or overall health, suggesting that it is relatively safe when used appropriately [13].

To date, most studies on *Alhagi maurorum* have been conducted in vitro or in animal models. There is a need for well-designed clinical trials to evaluate the efficacy and safety of *Alhagi maurorum* in humans. These studies should focus on its potential applications in managing oxidative stress-related diseases, such as cardiovascular diseases, neurodegenerative disorders, and chronic inflammatory conditions.

Exploration of Synergistic Effects

Another interesting area of research is the exploration of synergistic effects between *Alhagi maurorum* and other medicinal plants or synthetic drugs. Combining *Alhagi maurorum* with other antioxidants or anti-inflammatory agents could enhance its therapeutic potential and offer new treatment options for complex diseases.

Development of Novel Therapeutic Agents

The bioactive compounds isolated from *Alhagi maurorum* could serve as lead compounds for the development of novel therapeutic agents. By modifying these compounds or combining them with other active ingredients, researchers could develop new drugs with improved efficacy and safety profiles.

Antioxidants have become scientifically interesting compounds due to their many advantages, such as anti-inflammatory, normalizing oxidation-reduction, and inhibiting oncological tumors. Today it is used in many fields. In food technology, antioxidants are added to many food products to enrich foods and eliminate problems. For this reason, research on the determination of antioxidant activity of natural foods and their components is also continuing rapidly. [14]

In recent years, much attention has been paid to the field of free radical chemistry. Free radicals, reactive oxygen species and reactive nitrogen species, are formed by our body under the influence of various endogenous systems, various physiochemical conditions or pathological conditions. A balance between free radicals and antioxidants is necessary for proper physiological function. When free radicals lose the body's ability to regulate them, a condition called oxidative stress occurs. Thus, free radicals negatively modify lipids, proteins and DNA and cause a number of human diseases. [15]

Antioxidant property is directly related to the composition of plants, which in turn is assessed by vitamins, flavonoids, alkaloids and other bioactive substances. These bioactive plants include Alhagi maurorum. This plant has been reflected in the research work of world scientists.

Alhangi Mauroma - a type of legume, usually called camel thorns, Alhagi, Caspian manna, and Persian manna. The bush was born in Russia to Russia but was included in many other regions of the world, including Australia, South Africa, and the United States. Many years of plant grows from a large root system that can last more than 6 feet. The new buds may appear 20 feet away from the plant. This is a heavily branched gray-greenish with heavy thorns along the horns. It has a brown or reddish color and has small pink and dark red peas and small legumes. [16]

Previous studies show that it contains many secondary metabolites, such as flawoidists, fatty acids, Blumarine, steroids, steroids, alkaloids, steroids, alkaloids, steroids, and others. It indicates antibacterial, antibacterial, antioxidant, pain, pain, heart vascular, demonic, and many other effects. [16,17,18]

Alhagi Maurorum plant is grown for livestock. It is cut to make hay for small cattle and camels at the end of the spring. Manna, Shaker is formed in exudate, stems, and leaves and shaken the bushes in flowering. The Indian markets are sold in the name of (Turajabin) and are imported from Afghanistan and Iran. Today, manna is used to extract mannitol and tablets, and cosmetics are used to produce laxatives and varieties. It is mainly made up of monomer companies consisting of galactose and uranic acids. Alhagi Maurorum is usually used in folk medicine, liver diseases, various inconveniences of the gastric intestinal tract, general tonic, antiradical, constipation, and yellowish

arthritis. It is also used as a diuretic, anti-blooded microbial microbe, to treat dysentery, high respiratory system problems, wounds, hemorrhoids, and uterus problems. The roots were used as an aphrodisiac. The oil obtained from the leaves is used in the treatment of rheumatism. Alhagi Maurum is used to treat kidney stones made from the seeds of Maurorum. [17]

Ahaurum Maurum Powdry is checked for the ethanolic extract of roots (EE) and shows the following results:

1) EE's mice into the abdominal cavity reduced the body temperature depending on the dose. Reductions were from 0.2 to 3.3 degrees.

2) Treatment of frogs with ee blocked the effects of Neyrotransmittor, acetylcholine (ACH). Thus, the EE seemed to act as Gevsheti of the skeletal muscle.

3) Sending EE was reduced to the abdominal rats by 22.5%, so it seemed to the ee bradoxardogenic drugs. [18]

MATERIALS AND METHODS

Recently, extensive research has been classified into different types of free radicals. The three main categories are: reactive oxygen species (ROS), reactive nitrogen species (RNS), and reactive sulfur species (RSS), which are formed from oxygen, nitrogen, and sulfur atoms, respectively. Examples of ROS, RNS, and RSS include hydrogen oxide, hydrogen peroxide, singlet oxygen, alko-xyradical, peroxyl-radical, nitrogen monoxide, nitric oxide superoxide anion, hydroxyl anions, alkyl-thiol, etc. More specifically, the ROS group includes lipid peroxidation products and protein carbonyl species while the RNS group includes nitric oxide and peroxynitrites. Nitric oxide plays a key role in DNA damage, inflammation, cancer cell growth, and apoptotic malfunction, even though it has a lifespan of only a fraction of a second. In addition, peroxynitrites have the potential to cause lipid peroxidation, DNA damage, and long-term damage to all biomolecules. Similarly, sulfur species (RSS) may act in unison to damage biomolecules and, hence, extensive damage to genes in DNA may result in genes that produce ineffective proteins. The origin of radicals is not yet well defined, but our own body often produces free radicals in the process of breaking down nutrients to create the energy that allows our bodies to function. Endogenous sources are multifaction in mitochondria, peroxisomes, endoplasmic reticulum, phagocytic cells, etc. while some exogenous sources may be air pollution, ultraviolet radiation, alcohol, smoking, contact with heavy metals, pesticides, and certain drugs such as halothane and paracetamol. [19]

If the investigated compounds are added to the alcohol solution of 2.2-Difenil-1-Pichenil (DFPG), free radical molecules become non-radical shapes and color in dietal-1-dieteral-1-Pichenil-1-pixerly (dfpg) solution color changes. [20]

RESULT AND DISCUSSION

All samples were melted in water and ethyl alcohol in the amount of 1 mg/ml in the amount of ethyl alcohol and were initially used as a solution. The first solution was added to 3 ml of solution of 2,2-Difenlic 1-Picrenihidril (DFPG) in the amount of 10, 20, 30, 40, and 50 mc. The level of divergence of free radical (DFPG) free radical (pg) of 2.2-Difenil-1-Pikrilhidrik (DFPG) is given in Table 1.

The literature contains enough information on the antiques of the extract of medicinal plants, which has the maximum effect of polyphenols and extracts containing the most amount of polyphenols and flavonoids. Thus, the quality and quantitative composition of extracts for the composition of the next work and arf mechanism are required to explore the quality of the extracts for the composition of the next composition of the extracts (polyphenols, alkaloids, etc.).

Table 1

The level of divergency of 2,2-difenil-1-Picrenihidril (dfpg) free radical (dfpg) of the top of the snowball pope

Substance (alcohol solution)		Stem and leaf	Yantak seed
Ingance,% (as a result of 10 chi minutes)	10 mkl	5±1,3	18,1±1,8
	20 mkl	9,1±2,4	32,6±1,5
	30 mkl	11,4±2,5	60,7±1,4
	40 mkl	17±1,7	74,3±2,4
	50 mkl	20,2±1,6	83,5±2,8

Based on the results of the analysis, the level of 2,2-Difenil-1-Pikrilic (DFPGS) free radical growth is growing as it increases.

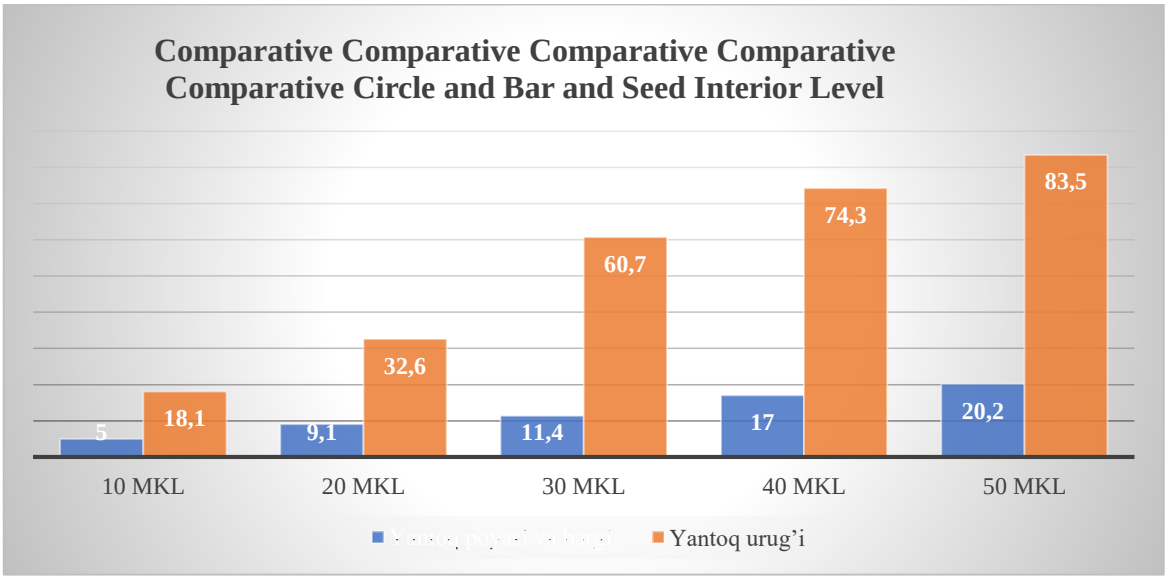

Figure 1. Comparative Comparative Comparative Comparative Comparative Circle and Bar and Seed Interior Level

CONCLUSION

The yently high is high according to the leaves of leaves and body parts. 10 mcL is 5% yantak stems and leaves, while the semen is 18.1%. The seed part is 6,62 times more active features. 20 mcL is 9.1%, and the shifts of the shore is 32.6%. The seed part is 3.58 times more active. At 30 mc m, yantak stems and leaves 11.4%, while the shore is 60.7%. The seed part is 6,32 times more active features. At 40 mc, yantak stems and leaves 17%, and the semen shine is 74.3%. The seed part is 4.37 times more active. On 50 mc mock, however, 20.2% and the semen is 83.5%. The seed part is 6.13 times more active.

Yantak stem and leaf extract 10 mcL and the level of ingredients in between 50 mcLs is growing 461 times. In the seed of the yantak, it is increasing 4.04 times.

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