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Review Article

Jār al-Nahr (*Potamogeton natans L.*): A Review on an Aquatic Medicinal Plant of Unani System of Medicine

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Abstract

Jār al-Nahr (*Potamogeton natans*), an aquatic herb from the family *Potamogetonaceae*, is recognized in Unani medicine for its therapeutic properties. It is widely distributed in freshwater ecosystems such as *Dāl*, *Anchar*, and *Mansbal* lakes in Kashmir. The plant is valued for treating ulcers, dry, malignant, and septic wounds. Phytochemical studies reveal the presence of starch, crude protein, fat, cellulose, and carotenoids, including rhodoxanthin, contributing to its pharmacological potential. Although extensively mentioned in Unani literature, its medicinal applications remain underexplored in modern research. This review aims to consolidate the pharmacognostical and phytochemical aspects of *P. natans*, highlighting its importance as a promising aquatic medicinal resource.

Keywords: *Aquatic herb, Jār-al-Nahr, Potamogeton natans, therapeutic properties, Unani medicine*

Introduction

Hemostatic drugs, critical in managing bleeding disorders, are not without limitations.[1] Many commercially available options are associated with adverse effects. For instance, hemostatic agents derived from human or animal components carry risks such as virus transmission, disease propagation, or severe allergic reactions like anaphylaxis.[2,3] These complications highlight the limitations of synthetic and biologically derived pharmaceuticals. Furthermore, many pharmaceutical coagulants are not only costly but may also have significant side effects, limiting their accessibility and widespread use, especially in low-resource settings.[4,5] This necessitates the exploration of alternative sources of hemostatic agents that are both safer and more sustainable. Among the potential solutions, plant-based medicines emerge as promising candidates due to their affordability, biocompatibility, and long-standing use in traditional medicine systems. Aquatic plants, in particular, offer untapped potential in this regard. Aquatic plants have long been valued in traditional medicine systems like Unani and Ayurveda for their hemostatic properties, offering a safer and more sustainable alternative to synthetic drugs. Many of these plants are also effective in treating gastrointestinal disorders and promoting wound healing. For instance, *Tālmakhāna* (*Astracantha longifolia* L.) is traditionally used to manage diarrhea and related bleeding conditions, while *Amsukh* (*Equisetum arvense*) not only stops diarrhea but also aids in healing intestinal ulcers. *Jār al-Nahr* is known for treating bleeding diarrhea, epistaxis, and intestinal ulcers, showcasing broad hemostatic efficacy. Similarly, *Nilofar* (*Nelumbo nucifera* Gaertn) has been widely utilized for its ability to manage intestinal ulcers and bleeding complications. These plants highlight the potential of aquatic species as effective and versatile hemostatic agents, warranting further exploration through modern research to validate and harness their therapeutic benefits. *Potamogeton natans* L. belongs to the family *Potamogetonacea*. The genus *Potamogeton* is difficult to restrict taxonomically because of its highly plastic morphological characters. However, very few investigations related to macro- and micromorphological characteristics of fruit have been carried out for their possible role in taxonomic delimitation.[6] The fruit morphology in *Potamogeton* is interesting and has remained a matter of debate for so long and has been variously described as a drupe, drupelet, achene, or nutlet by various researchers.[7] It is a large genus of aquatic herbs distributed in the

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temperate and tropical regions of the world. In India, 15 species are recorded. In Kashmir, it is various species are found in lakes like *Anchar Lake*, *Dal Lake*, *Mansbal Lake*, etc. [Table 1]. They bear submerged or floating leaves and minute flowers in axillary spikes. The fruits are small and indehiscent. The plant has little economic value; they serve as food for some wild water-fowls and ducks and as shelter and shade for fish. Sometimes, it is also said that they help in softening water by removing carbon dioxide and lime.[8]

The leaves of two species, *P. natans* and *Potamogeton crispus*, are reported to contain a pigment rhodoxanthin. The rootstocks of other species like *Potamogeton pectinatus* L. and *Potamogeton perfoliatus* are said to contain starch, crude protein, fat, cellulose, etc. They also contain 10.5 and 11.3 mg/100 g of carotene, respectively.[9] Hence, due to the presence of nutritious contents, they (*P. crispus* Linn, *Potamogeton lucens* Linn and *P. natans* Linn) are gathered and used as fodder in Kashmir and Ladakh, but no research has been done regarding their medicinal values. The drug *P. natans* has been mentioned in Unani literature for the treatment of various ailments (ulcers, dry wounds, malignant wounds, and septic wounds) and it is also said to be useful in homeopathy.[9] Moreover, this plant is easily available in various lakes of Kashmir. Hence, it is the need of the hour to explore its medicinal benefits with respect to modern parameters.

Table 1: Aquatic sites where *Potamogeton* species are seen in Kashmir[11]

Lakes of Kashmir	Species seen
Anchar Lake (Srinagar)	*P. natans, P. lucen, P. pusillus, P. crispus, P. pectinatus*
Dal Lake (Srinagar)	*P. natans, P. lucens, P. pusillus, P. crispus, P. pectinatus, P. nodosus, P. wrightii*
Manasbal Lake (Bandipora)	*P. natans, P. lucens, P. crispus, P. pusillus, P. nodosus, P. perfoliatus*

P. natans: Potamogeton natans, P. pectinatus: Potamogeton pectinatus, P. lucens: Potamogeton lucens, P. pusillus: Potamogeton pusillus, P. crispus: Potamogeton crispus, P. nodosus: Protoreaster nodosus, P. wrightii: Potamogeton wrightii

Materials and Methods

Various authentic both printed and electronic publications are taken into account for the review of *Jār al-Nahr* regarding pharmacognostical characteristics, therapeutic uses in Unani Medicine, phytochemical constituents, pharmacological studies, etc. All relevant articles up to 2023 were referred including Unani books, English books on Herbals, research papers, websites, and genuine materials published in PubMed, Science Direct Google Scholar, and Research Gate. Appropriate Unani Terminologies were taken from Standard Unani Medical Terminology Published by the Central Council for Research in Unani Medicine in collaboration with the World Health Organization.

Botanical description

P. natans is an aquatic plant. It has large oval floating leaves that are softly heart-shaped at the base where the petiole of the leaf attaches to the leaf, and there is a distinct color change in this species. Submersed leaves are generally modified to be long and needle-like or ribbon-like.[10] The plants of the genus are slender herbs with creeping rootstocks, found nearly throughout India inhabiting tanks, pools, ponds, freshwater, and canals often growing in clusters.[11] *P. natans* belongs to the family *Potamogetonaceae* [Figure 1].

Taxonomical classification

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Liliopsida
Order:	Alismatales
Family:	*Potamogetonaceae*
Genus:	*Potamogeton*
Species:	*P. natans*

Very limited information has been mentioned by Unani scholars, namely Ibn Sīnā, Zakariyyā Razī, Ibn Bayṭār,

Figure 1: Shows image of (a) *Jār al-Nahr (Potamogeton natans)* in natural source, (b and c) collected plant, (d) Herbarium prepared at Regional Research Institute of Unani Medicine, Srinagar

Hakim Momin Khan, Hakim Azam Khan, Najmul Ghani, and Kabiruddin in their classical books.

Mutaradifat (Vernacular Names)

The drug is known by various names according to the language and habitat as follows:

Arabic: *Silaq-al-Mā, Jār al-Nahr*,[12-16], *Lisān al-Baḥr.*

English: Broad-leaved pondweed, floating pondweed, floating-leaf pondweed.

Greek: *Fotamoghitun,*[16] *Botamoghitun*,[16] *Qotāmo'itūn*.[13]

Persian: *Hamsāya-i-Nahr.*[13]

Mizāj (temperament)

The temperament is mentioned as *Bārid yabis* (cold and dry) in 2nd degree,[12,13] and as per some physicians, it is *Bārid* (cold) and *Ratab* (moist).[14]

Description of drugs in Unani literature

Jār al-Nahr also known as *Silq-al-Mā*[14,15] flowers resemble *Nilofar* (*N. nucifera*) while leaves look similar to betel leaf.[16,17] Leaves float over the surface of the water and are leathery.[16] Flowers are yellow in color.[15] The leaves are green colored. It is found in or near stagnant water therefore also called *Hamsaya-i-Nahr*. It does not grow away from streams and water bodies. Most parts of it are submerged and few are out of water. As its leaves float on the water surface, it is called *Silaq-al-Mā.*[13,17] The root is hard, rough,[18] and has a slightly bitter taste.[14,15,17] As per *Jālīnūs*, it is similar to *Asa al-Ra'i* in astringent and coldness but more viscous.[16]As per *Galen* (*Jālīnūs*), *Jār al-Nahr* has *Mubarrid* (febrifuge) and *Qābiḍ* (astringent) properties.[13]

Therapeutic action and uses

It has *Ḥābbis-al-Dam* (haemostyptic)*, Qāṭi' 'Uṭash* (thirst quencher)*, Muḥallil-i-Awarām* (resolvent)*, Mudammil-i-Qurūḥ* (wound healing) and *Qābiḍ* (astringent) properties.[18-20]

It is useful in diarrhea, epistaxis, excessive thirst, blisters, pruritus, ulcers, dry wounds, malignant wounds, and septic wounds.[12-15,17]

Method of administration

- *Ishāl* (diarrhea): It has *Qābiḍ* (astringent) property so when taken orally diarrhea stops[15,17]
- *Ru'āf* (Epistaxis): Due to its astringent property, it is used to stop bleeding especially nasal bleeding[15,17]
- *'Uṭash* (thirst): Due to its *bārid* temperament, it quenches the thirst.[15,17,18]

Awarām, *Buthūr*, and *Jurūḥ wa Qurūḥ* (inflammations, wounds, and ulcers):

- Paste prepared from its extract is beneficial for healing various ulcers
- *Jār al-Nahr* when used in the form of paste or *Dharūr* (powder) form, resolves inflammation, and heals malignant, dry, and septic wounds[13,14,20]
- It also heals ulcers that tend to spread by a continuous discharge of pus and relieves itch and scabies (*Jarab*).[20] It also has anti-inflammatory properties.[15,17] To treat blisters, it is used in the form of paste[12]
- As per Dioscorides, *Jār al-Nahr* has astringent and cold action and it is beneficial in poisonous bites, chronic boils, itching, and blisters[16]
- When applied locally during hammam, it gives relief from *Jarab wa Ḥikka* (scabies and pruritus).[12]

Maḍarrat (adverse effect): It causes neurotoxicity if used in excess quantity.[12,18]

Musliḥ (corrective): After adding sugar, its toxicity can be countered.[12,17,18]

Badal (substitute): *'Asā al-Ra'i*[12,16] is used as a substitute. *Bīkh-i-Anjbār* (*Polygonum bistorta*) is mentioned as a substitute for its hemostatic property,[17,20] *Jarjīr* (*Eruca sativa*).[18]

Miqdār Khūrāk (dosage): The therapeutic dose is mentioned up to 9 g.[12,13,20]

Recent studies on *Jār al-Nahr*

Macroscopic evaluation

A study was carried out at the Regional Research Institute of Unani Medicine (RRIUM), Srinagar by Rifat *et al*. 2024 to evaluate the macroscopic study to differentiate the related species.[21] This evaluation involves the detailed study of the macroscopic appearances of the drug such as shape, and size, and the sensory profile such as odor, taste, and color of the crude drug sample [Table 2].

Macroscopic evaluation

A study was carried out at RRIUM, Srinagar, by Rifat *et al*.[21] to evaluate the physicochemical study of the drugs including ash value, extractive values, loss of weight on drying, thin layer chromatography (TLC), pH values, swelling index, foaming index, and fluorescence analysis. The weight of successive extracts in various solvents of the whole plant of *Jār al-Nahr* were found to be 5.18; 5.47; 14.94; and 33.65 in petroleum ether; ethyl acetate; methanol; and hydroalcoholic extract, respectively. Fixed oils, fats, resin, and volatile substances are present in petroleum ether extract. The percentage of successive extracts were 0.64%; 0.68%; 1.86%; and 4.2% for petroleum ether; ethyl acetate; methanol; and hydroalcoholic extract, respectively. The percentage of total ash, acid-insoluble ash, and water-soluble ash of the whole plant of *Jār-al-Nahr* were found to be 9.4%, 1.6%, and 5%, respectively. The percentage of water and alcohol soluble matter in the whole plant of *Jār al-Nahr* was found to be 5% w/w and 15.2% w/w by hot method and 4.2% w/w and 9.6% w/w by cold method, respectively. The loss on drying of the whole plant of *Jār al-Nahr* was found to be 8.8%. That is within the acceptable limit. The percentage of moisture

Table 2: Morphological characteristics of *Jār al-Nahr* (*Potamogeton natans* L.)[21]

Plant part	Odor	Color	Taste	Shape
Stem	Fishy when fresh. On drying smell characteristic	Dark green, leathery opaque with translucent longitudinal veins	Tasteless in the beginning and astringent later	Cylindrical, without many branches, and grows from 1 to 2 m
Leaves	Fishy when fresh. On drying smells characteristic	Green coloured in the early stage and later dark brown colored	Tasteless	4–11 × 2–4.5 (length × width) Both submerged and floating more or less spirally arranged Floating leaves are firm, oval-elliptic to egg-shaped with 17–37 veins flanking mid-rib
Flower	Fishy when fresh. On drying smells characteristic	The green color is in the early stage and dull yellow in the later stage	Tasteless	Flower spikes are dense and cylindrical 5–10 cm long pointed at tip rounded at base Flowers from May to September

content ranging from 10 % to 20% indicates a suitable range for minimum bacteria as well as fungal growth. The pH values of 1% and 10% solution of the whole plant of *Jār al-Nahr* (*P. natans* L.) were found to be 5.5 and 5.6, respectively, and indicate the presence of a slightly acidic nature. In this study, the foaming and swelling index was found to be zero. Anthraquinone glycosides and flavonoids were present in methanolic and hydroalcoholic extract, and cardiac glycosides were present in 3 extracts, namely ethyl acetate, methanolic, and hydroalcoholic extract. Steroids were present in petroleum ether, and ethyl acetate extract proteins were present in ethyl acetate and methanolic extracts. The result was obtained when the extract applied on the TLC plate was placed separately in the solvent system made of (i), pet ether:ethyl acetate (4.5:5.5) and (ii) petroleum benzene:ethyl acetate (7:3). The developed TLC plate was air dried and then viewed in the UV chamber. 4 spots were visible on the TLC plate at 265 nm and 365 nm respectively, in the solvent system. The analysis for heavy metals in the drug sample showed that the values for lead, cadmium, and mercury were found to be mg/L, 0.0000 mg/L, 0.0137 mg/L, and 0.8535 mg/L, respectively, and were under the permissible limits.[21]

Antioxidant property

In vitro, antioxidant activity of methanolic and hydroalcoholic of *Jār-ul-Nahr* (*P. natans* L) was reported by Rifat *et al*. 2024. In this study, five concentrations (0.125 mg/mL, 0.25 mg/ml, 0.5 mg/mL, 1 mg/mL, 2 mg/mL, and 4 mg/mL) of the methanolic and hydroalcoholic extracts of the whole plant of *Jār-ul-Nahr* (*P. natans* L.) were tested using DPPH radical scavenging against butylated hydroxyanisole. The antioxidant activity of each extract increased with increasing concentration. The inhibition of the DPPH free radical was found in a concentration-dependent manner; the reduction ability was found to be higher in hydroalcoholic extract followed by methanolic extract with little difference. The study showed that *Jār-ul-Nahr* (*P. natans* Linn) which is reported to have significant activity against several human ailments, could be exploited as a potential source of natural antioxidants for plant-based pharmaceutical industries.[22]

Conclusion

Jār al-Nahr (*P. natans* L), a notable aquatic herb, holds significant therapeutic potential, particularly in traditional systems of medicine such as Unani. Its reported efficacy in treating ulcers, and dry, malignant, and septic wounds underscores its importance as a natural remedy. Phytochemical investigations have revealed the presence of bioactive compounds, including starch, crude protein, fat, cellulose, and carotenoids like rhodoxanthin, which contribute to its pharmacological properties. Despite its availability in aquatic ecosystems like Kashmir's lakes, modern scientific research on its medicinal applications remains limited. Further exploration and validation of its pharmacological potential through contemporary studies are essential to fully harness its therapeutic benefits and integrate it into modern medical practices.

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Conflicts of interest

There are no conflicts of interest.

References

1. Seyednejad H, Imani M, Jamieson T, Seifalian AM. Topical haemostatic agents. Br J Surg 2008;95:1197-225.
2. Hino M, Ishiko O, Honda KI, Yamane T, Ohta K, Takubo T, *et al*. Transmission of symptomatic parvovirus B19 infection by fibrin sealant used during surgery. Br J Haematol 2000;108:194-5.
3. Pope M, Johnston KW. Anaphylaxis after thrombin injection of a femoral pseudoaneurysm: Recommendations for prevention. J Vasc Surg 2000;32:190-1.
4. Dhir B, Sharmila P, Parthasaradhi P. Potential of aquatic macrophytes for removing contaminants from the environment. Crit Rev Environ Sci Technol 2009;39:754-81.
5. Saravanakumar K, Prabhakaran J. Aquatic floral populations in Veeranam Lake command area, Tamil Nadu, India. Int J Curr

Biotechnol 2013;1:18-26.
6. Kaplan Z, Stepanek J. Genetic variation within and between populations of *Potamogeton pusillus* agg. Plant Syst Evol 2003;239:95-112.
7. Clapham AR, Tutin TG, Moore DM. Flora of the British Isles. Cambridge: CUP Archive; 1990.
8. Aijaz HG, Reshi ZA, Wafai BA, Khuroo AH. Fruit morphology of the genus *Potamogeton* L. in Kashmir Himalaya and its utility in taxonomic delimitation. J Asia Pac Biodivers 2017;10:274-8.
9. Anonymous. The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products. Vol. 8. New Delhi: NISCAIR, CSIR; 2004. p. 175–9.
10. Smagula AP, Connor J. Aquatic plants & algae of North Hemisphere's lakes and ponds. 1st ed. United States of America: New Hampshire Department of Environmental Services; 2007.
11. Ansari AP, Ahmed NZ, Wadud A, Arif M, Raheem A. Polyherbal pharmaceutical preparations in Unani medicine – A rational approach. Hippocratic J Unani Med 2019;14:1-16.
12. Ghani N. Khazāin al-Advia. Vol. 3. New Delhi: Idara Kitab-us-Shifa; 2010. p. 238, 148-50, 89-91.
13. A'zam K. Muhīt-i-A'zam. Vol. 3. New Delhi: Central Council for Research in Unani Medicine; 2013. p. 125-6.
14. Kabīruddīn M. Makhzanul Mufaradāt. New Delhi: Idara Kitab-us-Shifa; 2007. p. 169.
15. Momin KH. Tuhfatul muminīn. Lucknow: Munshi Nawalkishor; 1870. p. 121, 86-7.
16. Bayṫār I. Al-Jami Li Mufridat Al-Advia wa Al-Aghzia. Vol. 1, Urdu ed. New Delhi: Central Council for Research in Unani Medicine; 1985. p. 134, 241-2, 389-90.
17. Anonymous. World Health Organization (WHO). Quality Control Methods for Herbal Materials (updated edition of quality control methods for medicinal plant materials). 2011. p. 8, 25-8.
18. Antaki D. Tazkira ulul Albab wa Jami'ul Ajāb. Part 1. New Delhi: Central Council for Research in Unani Medicine; 2008. p. 191.
19. Sheerazi AM, Abdullah NM. Alfaz-ul-Advia. Kanpur: Munshi Nawal Kishore Publication; 1823. p. 80.
20. Hakīm A. Bustan-al-Mufardāt. New Delhi: Idara Kitabul Shifa; 2007. p. 211.
21. Rifat I, Kalam MA, Khanday S, Yousuf A, Salim S. Pharmacognostical study of *Jar-ul-Nahr* (*Potamogeton natans* Linn.) (whole plant) found in Dal-Lake Kashmir. Indian J Unani Med 2024;17:97-109.
22. Rifat I, Kalam MA, Khanday S, Salati H. Anti-Oxidant activity of an aquatic plant Jar-Ul-Nahr (*Potamogeton natans* Linn): A Unani Drug. Indian J Unani Med 2024;17:115-21.

Review Article

The Therapeutic Importance of Oxy+: An Overview

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Abstract

Oxy+ is a phytotherapeutic product derived from arthrospira (spirulina), produced in Aruba for Lifefactors. Spirulina, a blue-green microalga, is renowned for its rich nutritional profile and broad-spectrum pharmacological properties. This review highlights the therapeutic potential of Oxy+, focusing on its antioxidant, anti-inflammatory, antidiabetic, antihypertensive, anticancer, and immunomodulatory effects. The formulation contains key bioactive compounds such as phycocyanin, beta-carotene, chlorophyll, gamma-linolenic acid, and a variety of essential vitamins and minerals, all of which contribute to its diverse biological activities. Oxy+ demonstrates strong antioxidant capacity by neutralizing free radicals and reducing oxidative stress, which may help in the prevention of chronic diseases. Its anti-inflammatory effects are mediated through modulation of inflammatory pathways and biomarkers. Evidence also supports its role in improving insulin sensitivity and controlling blood glucose levels, making it beneficial for diabetes management. The antihypertensive action of Oxy+ is linked to peptides that inhibit angiotensin-converting enzyme, helping to regulate blood pressure. In addition, Oxy+ shows anticancer properties by inducing apoptosis, causing cell cycle arrest, and inhibiting tumor progression. Its ability to modulate the immune system further enhances its profile as a natural health supplement. Collectively, the pharmacological benefits of Oxy+ support its use as a promising therapeutic agent, warranting further clinical research to fully realize its potential in healthcare.

Keywords: *Health benefits, medicinal importance, Oxy+, spirulina, therapeutic importance*

Introduction

A natural supply of arthrospira called Oxy+ is produced in Aruba for life factors as a phytotherapeutic. Its chief ingredient is spirulina.[1] Spirulina, a genus of filamentous cyanobacteria or blue-green microalgae, has been revered for centuries due to its exceptional nutritional value and potential health benefits.[2] Historically, spirulina was consumed by ancient civilizations like the Aztecs and Mayans, who recognized its nourishing properties.[3] In modern times, it has gained significant popularity as a dietary supplement and functional food due to its rich composition of proteins, essential amino acids, vitamins, minerals, antioxidants, and unique bioactive compounds.[4] The striking nutritional profile of phytotherapeutic makes it a promising candidate for addressing malnutrition and improving overall well-being, especially in regions where access to balanced diets is limited.[5] Its ability to grow in diverse environments, ranging from freshwater lakes to alkaline waters, contributes to its global availability and potential as a sustainable food source.[6] Furthermore, Oxy+ is being extensively researched for its potential pharmacological activities, including antioxidant, anti-inflammatory, antidiabetic, antihypertensive, anticancer, and immunomodulatory effects.[1,7] These activities are attributed to the bioactive compounds present within Oxy+, such as phycocyanin, beta-carotene, chlorophyll, gamma-linolenic acid, and various vitamins and minerals.[8] Understanding and harnessing these properties hold promise for improving human health and addressing prevalent diseases and conditions.[9] This introduction provides a glimpse into the multifaceted nature of Oxy+, setting the stage for a comprehensive exploration of its composition, potential health benefits, and applications in nutrition and medicine.[10]

Pharmacological Actions of Oxy+

Oxy+, a blue-green microalga, exhibits a range of pharmacological actions due to its diverse bioactive compounds and nutritional components.[11] These actions contribute to its potential therapeutic benefits in various health conditions.[12]

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Antiviral Effect of Oxy+

Oxy+, a phytotherapeutics, has garnered attention for its potential antiviral properties, making it a subject of interest in both traditional and modern medicine. Several studies suggest that Oxy+ may exert antiviral effects against a range of viruses.[13] The antiviral potential of Oxy+ can be attributed to its unique composition of bioactive molecules and nutritional components, which contribute to its immunomodulatory, antiviral, and anti-inflammatory actions.[14] Oxy+ is known to enhance the immune response by stimulating the production and activity of immune cells, such as T-cells, B-cells, and natural killer cells. A strengthened immune system can better recognize and combat viral infections, potentially limiting their spread and severity.[15] Interferons are signaling proteins produced by the immune system in response to viral infections. Research suggests that Oxy+ may induce the production of interferons, which can inhibit viral replication and spread within the body.[16] Oxy+ contains bioactive compounds such as phycocyanin, sulfated polysaccharides, and glycolipids, which have demonstrated antiviral properties. These compounds may interfere with viral attachment, entry, replication, and release, thereby inhibiting the viral lifecycle.[17] Oxy+ extracts have been shown to inhibit the replication of certain viruses by disrupting essential viral proteins or RNA/DNA synthesis. This inhibition can potentially hinder the virus's ability to proliferate and cause infection.[18] Oxy+ has antioxidant and anti-inflammatory properties that may protect cells and tissues from damage caused by viral infections. By reducing oxidative stress and inflammation, Oxy+ may mitigate the severity of viral-induced symptoms.[19] Oxy+ has been studied for its potential in managing respiratory viral infections, including influenza viruses and respiratory syncytial virus. Research suggests that Oxy+ extracts may alleviate symptoms and reduce viral loads associated with these infections.[20] Studies indicate that Oxy+ extracts may possess inhibitory effects against herpes simplex virus, potentially reducing the frequency and severity of outbreaks caused by this viral infection.[21] While further research is needed, some studies have explored the potential of Oxy+ in managing HIV/AIDS. Oxy+ revealed immunomodulatory effects and ability to support the immune system may offer benefits to individuals living with HIV.[22] Understanding and further exploring Oxy+ has antiviral effects is crucial for harnessing its potential as a natural antiviral agent or as a supportive component in antiviral strategies. However, more research, including clinical trials, is necessary to validate and establish Oxy+ is effectiveness and safety in managing various viral infections.[23]

Antibacterial Effect of Oxy+

Oxy+, a phytotherapeutic, possesses antibacterial properties that have been the subject of numerous studies exploring its potential as a natural antimicrobial agent. The antibacterial effect of Oxy+ can be attributed to its unique composition of bioactive molecules, including phycocyanin, polysaccharides, peptides, vitamins, and minerals, among others.[24] Oxy+ has demonstrated direct bactericidal effects against a wide range of bacteria, including both Gram-positive and Gram-negative strains. It inhibits bacterial growth by disrupting cell membrane integrity, altering membrane permeability, and interfering with essential cellular processes.[25] Biofilm formation is a crucial mechanism that bacteria use to adhere to surfaces and protect themselves from antibiotics. Oxy+ has been shown to inhibit bacterial adhesion to surfaces, disrupting biofilm formation and making bacteria more susceptible to antibiotics.[26] Oxy+ contains bioactive peptides with antibacterial properties. These peptides may disrupt bacterial cell membranes, inhibit bacterial protein synthesis, and interfere with cellular functions, ultimately leading to bacterial death.[27] Oxy+ can enhance the immune response, making the body better equipped to fight bacterial infections. By boosting immune cell activity, such as macrophages and lymphocytes, Oxy+ indirectly contributes to bacterial clearance.[26] Oxy+ has been found to enhance the effectiveness of certain antibiotics when used in combination. This suggests a potential synergistic effect, where Oxy+ complements the action of antibiotics, improving bacterial eradication.[28] Oxy+ has shown effectiveness against antibiotic-resistant strains of bacteria, including methicillin-resistant *Staphylococcus aureus* and multidrug-resistant *Pseudomonas aeruginosa*. This suggests its potential utility in combating antibiotic resistance.[29] Oxy+ has antibacterial properties that may be beneficial for gastrointestinal health by inhibiting the growth of harmful bacteria in the gut, promoting a balanced gut microbiota, and potentially preventing gastrointestinal infections.[30] Oxy+ extracts or formulations have been explored for their potential in wound healing and as topical antimicrobial agents. They may help in preventing or treating bacterial infections associated with wounds and skin conditions.[31] Understanding the antibacterial effects of Oxy+ is significant for exploring its potential applications as a natural antibacterial agent, dietary supplement, or as a component in personal care and healthcare products. However, further research, particularly clinical studies, is essential to validate its antibacterial efficacy and safety for various applications.[32]

Antifungal Effect of Oxy+

Oxy+, a phytotherapeutic, has shown promising antifungal properties in several studies, indicating its potential as a natural antifungal agent.[33] The antifungal effect of Oxy+ can be attributed to its unique composition of bioactive compounds and nutritional components.[34] Oxy+ extracts have been found to exhibit direct fungicidal effects against a variety of fungi, including common fungal pathogens. These effects can disrupt fungal cell membranes, inhibit cellular respiration, and interfere with essential cellular

processes, ultimately leading to fungal cell death.[35] Oxy+ has demonstrated the ability to inhibit the growth of various fungal species. The compounds in Oxy+ may interfere with fungal metabolic pathways and cellular functions, thus preventing fungal proliferation and spread.[36] Oxy+ contains bioactive peptides and proteins that possess antifungal properties. These peptides can disrupt fungal cell walls and membranes, interfere with fungal enzyme systems, and inhibit fungal growth.[37] Oxy+ extracts may cause changes in fungal morphology and structure, such as hyphal distortion and alterations in spore formation. These changes can impede fungal growth and development.[38] Oxy+ has been investigated for its potential to enhance the antifungal effects of conventional antifungal drugs. Studies suggest that combining Oxy+ with antifungal agents can result in synergistic effects, potentially improving the overall antifungal activity.[39] Fungal biofilms are organized communities of fungal cells that are resistant to antifungal agents. Oxy+ has been studied for its ability to inhibit fungal biofilm formation, making it a potential agent for preventing biofilm-related fungal infections.[40] Oxy+ extracts have shown effectiveness in inhibiting fungal growth in agriculture and food preservation. They may be used as a natural and eco-friendly alternative to chemical fungicides in agriculture or as natural preservatives to extend the shelf life of food products.[41] Understanding the antifungal effects of Oxy+ is important for exploring its potential applications in the management of fungal infections, agriculture, food preservation, and related industries.[42] However, further research, including *in vivo* and clinical studies, is needed to validate its antifungal efficacy and safety for various applications.

Antioxidant Effect of Oxy+

Oxy+, a phytotherapeutics, is renowned for its potent antioxidant properties, making it a popular dietary supplement and functional food.[43] Antioxidants help combat oxidative stress by neutralizing harmful free radicals in the body, which are linked to various chronic diseases and aging processes. Oxy+ has antioxidant effect that can be attributed to its unique composition of bioactive compounds and nutrients.[44] Phycocyanin, a blue pigment found in Oxy+, is a potent antioxidant that scavenges free radicals and inhibits oxidative damage. It helps protect cells and tissues from oxidative stress, making it a key contributor to Oxy+ showed antioxidant properties.[45] Oxy+ is rich in beta-carotene, a precursor of Vitamin A and a powerful antioxidant. Beta-carotene helps protect cells from oxidative damage caused by free radicals, particularly in the eyes and skin.[24] Chlorophyll, the green pigment in Oxy+, possesses antioxidant properties and may help neutralize free radicals. It supports the detoxification process and assists in cellular repair and regeneration.[46] Oxy+ contains Superoxide Dismutase, an enzyme that acts as a powerful antioxidant by breaking down superoxide radicals into less harmful molecules. SOD helps protect cells and tissues from oxidative stress.[47] Oxy+ contains Vitamin E, a potent antioxidant that helps protect cell membranes from oxidative damage. In addition, selenium, an essential mineral in Oxy+, supports the body's antioxidant defense mechanisms.[48] Oxy+ is a source of phenolic compounds, which have antioxidant properties and can help neutralize free radicals, contributing to its overall antioxidant effect.[9] Oxy+ has shown the ability to chelate metals, which is important for mitigating oxidative stress associated with metal-induced free radical generation. This property further enhances its antioxidant capabilities.[49] Oxy+ may support the production and recycling of glutathione, a critical antioxidant in the body. Glutathione helps protect cells from oxidative damage and is involved in various cellular processes.[50] By effectively neutralizing free radicals and reducing oxidative stress, Oxy+ revealed antioxidant effect plays a crucial role in supporting overall health, reducing the risk of chronic diseases, and promoting longevity.[51] Incorporating Oxy+ into the diet can be a valuable strategy to enhance the body's antioxidant defense system.

Immunomodulator Effect of Oxy+

Oxy+, a phytotherapeutic, is known for its immunomodulatory effects, influencing and enhancing the immune system's responses.[52] Immunomodulation involves the modulation or regulation of the immune system to maintain a balanced and efficient defense against pathogens while preventing immune-related disorders.[53] Oxy+ has been shown to stimulate the activity of various immune cells, including T-cells, B-cells, natural killer cells, and macrophages. These immune cells play crucial roles in identifying and eliminating pathogens such as bacteria, viruses, and cancer cells.[54] Oxy+ can modulate the production and activity of cytokines, which are signaling molecules involved in the immune response. It can balance pro-inflammatory and anti-inflammatory cytokines, promoting a regulated immune response.[55] Oxy+ has been observed to enhance the production of immunoglobulins, such as IgA, IgG, and IgM, which are essential antibodies that play a critical role in the immune defense against infections.[56] Oxy+ may activate Toll-like receptors, essential components of the immune system, triggering immune responses against pathogens. TLR activation leads to the production of pro-inflammatory cytokines and an increased immune defense.[57] Oxy+ has antiviral and antimicrobial properties that contribute to its immunomodulatory effect by helping the immune system fight off viral and bacterial infections, supporting a healthy immune response.[58] Oxy+ has antioxidant properties that help reduce oxidative stress, which can negatively impact the immune system. By mitigating oxidative stress, Oxy+ supports a stronger and more effective immune response.[59] Oxy+ can positively influence gut microbiota composition, promoting a healthy gut microbiome. A healthy gut microbiome is closely linked to a well-functioning immune system.[60] Oxy+, major bioactive compounds,

may modulate specific signaling pathways associated with immune responses, contributing to the overall immunomodulatory effect.[59] The immunomodulatory effect of Oxy+ is significant as it can support immune system health and function, making it a potential dietary supplement to enhance the body's natural defense mechanisms.[61] However, further research, including clinical trials, is needed to fully understand the extent and mechanisms of Oxy+, which has immunomodulatory properties.

Antidiabetic Effect of Oxy+

It has gained attention for its potential antidiabetic effects and its ability to assist in managing diabetes.[1,2] The antidiabetic effect of Oxy+ can be attributed to its unique composition of bioactive compounds, including phycocyanin, polysaccharides, gamma-linolenic acid, antioxidants, vitamins, and minerals.[62] Oxy+ has been shown to enhance insulin sensitivity, enabling cells to utilize glucose more efficiently. Improved insulin sensitivity can help manage blood sugar levels and reduce the risk of insulin resistance.[63] Oxy+ has demonstrated the ability to regulate blood glucose levels by inhibiting enzymes involved in carbohydrate digestion and absorption. This can help prevent rapid spikes in blood sugar after meals.[64] Studies suggest that Oxy+ supplementation can lead to better glycemic control in individuals with diabetes, including reduced fasting blood glucose levels and improved HbA1c levels, an indicator of long-term blood sugar control.[65] Oxy+ may enhance glucose uptake by cells, particularly muscle cells, which helps in utilizing glucose from the bloodstream and lowering blood glucose levels.[66] Oxy+ revealed antioxidant properties may protect pancreatic beta-cells, which are responsible for insulin production. In addition, some studies suggest that Oxy+ may support the regeneration of damaged beta-cells.[63] Oxy+ supplementation has been associated with improvements in lipid profile, including a reduction in triglycerides and LDL cholesterol levels. Managing lipid levels is important for individuals with diabetes to reduce the risk of cardiovascular complications.[67] Oxy+ has anti-inflammatory properties that may play a role in managing diabetes by reducing chronic inflammation often associated with the disease. Inflammation can contribute to insulin resistance and complications of diabetes.[68] Oxy+ has antioxidants property, which help combat oxidative stress, which is heightened in diabetes. By reducing oxidative stress, Oxy+ supports overall health and may aid in managing diabetic complications.[69] Oxy+ may contribute to weight management by promoting a feeling of fullness and assisting in weight loss, which is beneficial for individuals with diabetes, as maintaining a healthy weight is key in diabetes management.[70] Utilizing Oxy+ as a dietary supplement, along with a balanced diet and lifestyle modifications, may offer potential benefits for individuals with diabetes.[71] However, it is important to consult with a healthcare professional before making any significant dietary changes or introducing new supplements into a diabetic management plan.

Antidyslipidemic Effect of Oxy+

Oxy+, a phytotherapeutic, has been recognized for its potential antidyslipidemic effects, aiding in the management of lipid disorders or dyslipidemia.[72] Dyslipidemia involves abnormal levels of lipids (cholesterol and triglycerides) in the blood, which can lead to cardiovascular diseases. The potential antidyslipidemic effect of Oxy+ can be attributed to its unique composition of bioactive compounds and nutrients.[73] Oxy+ has been reported to lower total cholesterol levels in individuals with dyslipidemia. Its active components may inhibit cholesterol synthesis in the liver, leading to reduced overall cholesterol levels.[74] Oxy+ has shown promise in reducing LDL cholesterol, often referred to as "bad" cholesterol. By enhancing LDL receptor activity, it facilitates the removal of LDL cholesterol from the bloodstream.[73] HDL cholesterol is considered "good" cholesterol as it helps remove LDL cholesterol from the arteries. Oxy+ may elevate HDL cholesterol levels, contributing to an improved lipid profile.[75] Oxy+ has been shown to lower triglyceride levels, which is crucial in managing dyslipidemia. Reduction in triglycerides is associated with a lower risk of cardiovascular disease.[76] Oxy+ has antioxidant properties that inhibit lipid peroxidation, a process that damages lipids and contributes to cardiovascular issues. By reducing lipid peroxidation, Oxy+ helps maintain healthy lipid levels.[77] Oxy+ may influence lipid metabolism by modulating enzymes involved in lipid synthesis and metabolism. This modulation can lead to a favorable lipid profile.[78] Oxy+ can regulate apolipoproteins, proteins responsible for the transport and metabolism of lipids. This regulation contributes to maintaining a healthy balance of lipids in the blood.[79] Oxy+ revealed anti-inflammatory properties may help mitigate the inflammation associated with dyslipidemia. Chronic inflammation can contribute to lipid abnormalities and cardiovascular complications.[80] Oxy+ has been shown to support liver health and function. A healthy liver is crucial for lipid metabolism and regulation, contributing to improved lipid levels.[81] Incorporating Oxy+ as a dietary supplement, along with a balanced diet and lifestyle modifications, may offer potential benefits for individuals with dyslipidemia.[82] However, it is important to consult with a healthcare professional before making any significant dietary changes or introducing new supplements into a dyslipidemia management plan.

Antihypertensive Effect of Oxy+

It has shown promising antihypertensive effects, suggesting its potential to aid in managing high blood pressure (hypertension).[83] Hypertension is a significant risk factor for cardiovascular diseases. The antihypertensive effect of Oxy+ can be attributed to its unique composition of

bioactive compounds and nutrients.[84] Oxy+ contains peptides that can inhibit angiotensin-converting enzyme (ACE), a key enzyme in the renin-angiotensin-aldosterone system that regulates blood pressure. Inhibition of ACE can lead to vasodilation and reduced blood pressure.[85] Certain bioactive components in Oxy+ can promote vasodilation, relaxing and widening the blood vessels. This results in improved blood flow and reduced blood pressure.[86] Oxy+ may enhance the production of nitric oxide, a molecule that plays a crucial role in relaxing blood vessels, contributing to antihypertensive effects.[87] Oxy+ is a good source of potassium, a mineral that helps balance sodium levels and regulate blood pressure. Adequate potassium intake can aid in controlling hypertension.[88] Peptides derived from Oxy+ have been shown to induce relaxation of arterial smooth muscles, which helps in reducing blood pressure.[75] Oxy+, revealed antioxidant properties help reduce oxidative stress, a factor linked to hypertension. By neutralizing free radicals, Oxy+ supports overall cardiovascular health.[89] Oxy+ may modulate the sympathetic nervous system, which plays a role in blood pressure regulation. This modulation can contribute to antihypertensive effects.[75] Oxy+ has ability to improve lipid profile, including lowering LDL cholesterol and triglycerides, and can indirectly contribute to its antihypertensive effects by reducing cardiovascular risk factors.[90] Oxy+ has anti-inflammatory properties that can help reduce inflammation, which is associated with hypertension. Lowering inflammation may aid in managing blood pressure.[91] Incorporating Oxy+ as part of a balanced diet and a healthy lifestyle may contribute to its potential antihypertensive effects.[92] However, individuals with hypertension should consult their healthcare provider before making any significant dietary changes or using supplements to manage their condition.

Anticarcinogenic Effect of Oxy+

The potential anticarcinogenic effect of Oxy+ can be attributed to its diverse composition of bioactive compounds and nutrients.[1,4] Oxy+ is rich in antioxidants, such as phycocyanin, beta-carotene, chlorophyll, and vitamins, which help neutralize free radicals and oxidative stress.[93] Oxidative stress can contribute to the initiation and progression of cancer, making antioxidants important in preventing DNA damage and carcinogenesis.[94] Chronic inflammation is closely associated with the development and progression of cancer. Oxy+ has anti-inflammatory properties that help mitigate inflammation and may inhibit the inflammatory processes linked to carcinogenesis.[95] Oxy+ has been shown to induce apoptosis (programmed cell death) in cancer cells. This process helps eliminate abnormal or damaged cells, preventing the uncontrolled growth and spread of cancer.[96] Oxy+, major bioactive compounds, can cause cell cycle arrest at various stages, preventing the rapid division and growth of cancer cells. Halting the cell cycle inhibits the formation of tumors.[96] Oxy+ has been studied for its potential to inhibit angiogenesis, the formation of new blood vessels that supply nutrients to tumors. By preventing angiogenesis, Oxy+ may help restrict tumor growth.[97] Oxy+ has immunomodulatory effects that enhance the immune response against cancer cells. This may include increased activity of immune cells, such as T-cells and natural killer cells, aiding in the detection and elimination of cancerous cells.[98] Oxy+ may exhibit antimetastatic effects, inhibiting the spread of cancer cells to distant organs and reducing the potential for metastasis, a critical aspect of cancer progression.[99] Oxy+ has a potential to assist in detoxification and support metabolic processes that can contribute to reducing the risk of cancer by minimizing exposure to carcinogens and optimizing cellular health.[100] Oxy+ has been found to offer protection against certain carcinogens and toxins, potentially reducing the risk of cancer initiation.[101] The studies exploring Oxy+, which have potential anticarcinogenic effects are promising, but further research, including clinical trials, is needed to better understand the extent and mechanisms of Oxy+, revealed anticancer properties.[95] It's essential to consult with healthcare professionals before considering Oxy+ or any other supplement as a part of cancer prevention or treatment.

Conclusion

Oxy+ is a versatile blue-green microalga, that offers a wide array of therapeutic applications in human health. Its diverse composition of bioactive compounds, antioxidants, vitamins, minerals, and unique nutritional components contributes to its multifaceted health benefits. Oxy+ has demonstrated significant potential in several key areas of human health, making it a compelling candidate for various therapeutic applications. Oxy+ serves as a valuable source of essential nutrients, including proteins, amino acids, vitamins, and minerals. Its nutritional profile makes it a suitable supplement for addressing malnutrition and improving overall well-being, particularly in regions with limited access to balanced diets. Oxy+, revealed robust antioxidant properties that help combat oxidative stress and neutralize free radicals, reducing the risk of chronic diseases and mitigating inflammation. These effects contribute to its potential in preventing and managing various health conditions. Oxy+ has ability to enhance insulin sensitivity, regulate blood glucose levels, and improve glycemic control positions it as a supportive component in diabetes management strategies. Oxy+ has capacity to inhibit angiotensin-converting enzyme (ACE), induce vasodilation, and modulate blood pressure-regulating mechanisms making it a promising natural antihypertensive agent. Oxy+ revealed anti-dyslipidemic effects, including the reduction of total cholesterol, LDL cholesterol, and triglycerides, which offer potential benefits in managing lipid disorders and reducing cardiovascular risk. Oxy+ has antiviral and antimicrobial actions that can assist in the prevention and treatment of viral and bacterial infections,

supporting immune health. Oxy+ has anticarcinogenic properties, including its antioxidant, anti-inflammatory, apoptosis-inducing, and immune-boosting effects, and hold promise in cancer prevention and adjunctive cancer therapy. Oxy+ has immunomodulatory effects that enhance the immune response, making it a potential candidate for boosting immunity and supporting overall health. Oxy+ has the potential to protect the liver, support detoxification processes, and regulate hepatic function contributing to its role in maintaining liver health. Oxy+ may assist in weight management by promoting satiety and supporting a balanced gut microbiota, potentially improving gastrointestinal health. While Oxy+ shows considerable promise in these therapeutic applications, it is essential to note that further research, including clinical studies, is needed to confirm its efficacy and safety in specific medical contexts. In addition, individuals should consult healthcare professionals before incorporating Oxy+ into their healthcare routines, especially if they have pre-existing health conditions or are taking medications. Overall, Oxy+ revealed versatility and potential in promoting human health underscoring its value as a natural and nutritious supplement in the pursuit of holistic well-being.

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Conflicts of interest

There are no conflicts of interest.

References

1. Alam MA, Quamri MA, Ahmad Bhat MD, Aafreen S, Sofi G. Oxy+ (arthrospira) and its medicinal importance: An appraisal. Drug Metab Pers Ther 2020;36:251-7.
2. Alam MA, Haider N, Ahmed S, Alam MT, Azeez A, Perveen A. Tahlab (*Spirulina*) and few other medicinal plants having anti-oxidant & immunomodulatory properties described in Unani medicine-a review. Int J Pharm Sci Res 2013;4:4158.
3. Karkos PD, Leong SC, Karkos CD, Sivaji N, Assimakopoulos DA. *Spirulina* in clinical practice: Evidence-based human applications. Evid Based Complement Alternat Med 2011;2011:531053.
4. Alam MA, Haider N, Husain S, Ahmad S, Alam T. Dafe'-E-Sart'an (anticancer) activity of T'ah'lab (*Spirulina*)-a review. Int J Pharm Bio Sci 2013;4:1148-55.
5. Pentón-Rol G, Marín-Prida J, McCarty MF. C-phycocyanin-derived phycocyanobilin as a potential nutraceutical approach for major neurodegenerative disorders and COVID-19- induced damage to the nervous system. Curr Neuropharmacol 2021;19:2250-75.
6. DiNicolantonio JJ, Bhat AG, OKeefe J. Effects of *Spirulina* on weight loss and blood lipids: A review. Open Heart 2020;7:e001003.
7. Chaouachi M, Vincent S, Groussard C. A review of the health-promoting properties of *Spirulina* with a focus on athletes' performance and recovery. J Diet Suppl 2024;21:210-41.
8. Sorrenti V, Castagna DA, Fortinguerra S, Buriani A, Scapagnini G, Willcox DC. *Spirulina* microalgae and brain health: A scoping review of experimental and clinical evidence. Mar Drugs 2021;19:293.
9. Finamore A, Palmery M, Bensehaila S, Peluso I. Antioxidant, immunomodulating, and microbial-modulating activities of the sustainable and ecofriendly *Spirulina*. Oxid Med Cell Longev 2017;2017:1-14.
10. Trotta T, Porro C, Cianciulli A, Panaro MA. Beneficial effects of *Spirulina* consumption on brain health. Nutrients 2022;14:676.
11. Bortolini DG, Maciel GM, Fernandes IA, Pedro AC, Rubio FT, Branco IG, *et al*. Functional properties of bioactive compounds from *Spirulina* spp.: Current status and future trends. Food Chem (Oxf) 2022;5:100134.
12. Silva MR, da Silva GM, Silva AL, Lima LR, Bezerra RP, Marques DA. Bioactive compounds of *Arthrospira* spp. (*Spirulina*) with potential anticancer activities: A systematic review. ACS Chem Biol 2021;16:2057-67.
13. Daoud HM, Soliman EM. Evaluation of *Spirulina platensis* extract as natural antivirus against foot and mouth disease virus strains (A, O, SAT2). Vet World 2015;8:1260-5.
14. Hernández-Corona A, Nieves I, Meckes M, Chamorro G, Barron BL. Antiviral activity of *Spirulina* maxima against herpes simplex virus type 2. Antiviral Res 2002;56:279-85.
15. Abd El-Baky HH, El-Baroty GS. *Spirulina* maxima L-asparaginase: Immobilization, antiviral and antiproliferation activities. Recent Pat Biotechnol 2020;14:154-63.
16. Chen W, Chen YH, Liao YC, Huang XW, Lu TJ, Shih SR. Effect of hot water extracts of *Arthrospira* maxima (*Spirulina*) against respiratory syncytial virus. Phytomedicine 2023;110:154611.
17. Chen YH, Chang GK, Kuo SM, Huang SY, Hu IC, Lo YL, *et al*. Well-tolerated *Spirulina* extract inhibits influenza virus replication and reduces virus-induced mortality. Sci Rep 2016;6:24253.
18. Sibiya T, Ghazi T, Chuturgoon A. The potential of *Spirulina platensis* to ameliorate the adverse effects of highly active antiretroviral therapy (HAART). Nutrients 2022;14:3076.
19. El-Shall NA, Jiang S, Farag MR, Azzam M, Al-Abdullatif AA, Alhotan R, *et al*. Potential of *Spirulina platensis* as a feed supplement for poultry to enhance growth performance and immune modulation. Front Immunol 2023;14:1-12.
20. Hayashi T, Hayashi K, Maeda M, Kojima I. Calcium spirulan, an inhibitor of enveloped virus replication, from a blue-green alga *Spirulina platensis*. J Nat Prod 1996;59:83-7.
21. Perna A, Hay E, Sellitto C, Del Genio E, De Falco M, Guerra G, *et al*. Antiinflammatory activities of curcumin and *Spirulina*: Focus on their role against COVID-19. J Diet Suppl 2023;20:372-89.
22. Ayehunie S, Belay A, Baba TW, Ruprecht RM. Inhibition of HIV-1 replication by an aqueous extract of *Spirulina platensis* (*Arthrospira platensis*). J Acquir Immune Defic Syndr Hum Retrovirol 1998;18:7-12.
23. Ngo-Matip ME, Pieme CA, Azabji-Kenfack M, Moukette BM, Korosky E, Stefanini P, *et al*. Impact of daily supplementation of *Spirulina platensis* on the immune system of naïve HIV-1 patients in Cameroon: A 12-months single blind, randomized, multicenter trial. Nutr J 2015;14:70.
24. Abdel-Moneim AE, El-Saadony MT, Shehata AM, Saad AM, Aldhumri SA, Ouda SM, *et al*. Antioxidant and antimicrobial activities of *Spirulina platensis* extracts and biogenic selenium nanoparticles against selected pathogenic bacteria and fungi. Saudi J Biol Sci 2022;29:1197-209.
25. Ozdemir G, Karabay NU, Dalay MC, Pazarbasi B. Antibacterial activity of volatile component and various extracts of *Spirulina platensis*. Phytother Res 2004;18:754-7.
26. Alshuniaber MA, Krishnamoorthy R, AlQhtani WH.

Antimicrobial activity of polyphenolic compounds from *Spirulina* against food-borne bacterial pathogens. Saudi J Biol Sci 2021;28:459-64.
27. El-Sheekh MM, Daboor SM, Swelim MA, Mohamed S. Production and characterization of antimicrobial active substance from *Spirulina platensis*. Iran J Microbiol 2014;6:112-9.
28. Kaushik P, Chauhan A. *In vitro* antibacterial activity of laboratory grown culture of *Spirulina platensis*. Indian J Microbiol 2008;48:348-52.
29. Abdel-Moneim AE, Shehata AM, Selim DA, El-Saadony MT, Mesalam NM, Saleh AA. *Spirulina platensis* and biosynthesized selenium nanoparticles improve performance, antioxidant status, humoral immunity and dietary and ileal microbial populations of heat-stressed broilers. J Therm Biol 2022;104:103195.
30. Yu J, Ma D, Qu S, Liu Y, Xia H, Bian F, *et al*. Effects of different probiotic combinations on the components and bioactivity of *Spirulina*. J Basic Microbiol 2020;60:543-57.
31. Neyrinck AM, Taminiau B, Walgrave H, Daube G, Cani PD, Bindels LB, *et al*. *Spirulina* protects against hepatic inflammation in aging: An effect related to the modulation of the gut microbiota? Nutrients 2017;9:633.
32. Wulandari DA, Sidhartha E, Setyaningsih I, Marbun JM, Syafruddin D, Asih PB. Evaluation of antiplasmodial properties of a cyanobacterium, *Spirulina platensis* and its mechanism of action. Nat Prod Res 2018;32:2067-70.
33. Sidorowicz A, Margarita V, Fais G, Pantaleo A, Manca A, Concas A, *et al*. Characterization of nanomaterials synthesized from *Spirulina platensis* extract and their potential antifungal activity. PLoS One 2022;17:e0274753.
34. Marangoni A, Foschi C, Micucci M, Nahui Palomino RA, Gallina Toschi T, Vitali B, *et al*. *In vitro* activity of *Spirulina platensis* water extract against different *Candida* species isolated from vulvo-vaginal candidiasis cases. PLoS One 2017;12:e0188567.
35. Gheda S, Abd El-Zaher EH, Abou-Zeid AM, Bedair NA, Pereira L. Potential activity of *Arthrospira platensis* as antioxidant, cytotoxic and antifungal against some skin diseases: Topical cream application. Mar Drugs 2023;21:160.
36. Scaglioni PT, Pagnussatt FA, Lemos AC, Nicolli CP, Del Ponte EM, Badiale-Furlong E. *Nannochloropsis* sp. and *Spirulina* sp. as a source of antifungal compounds to mitigate contamination by *Fusarium graminearum* species complex. Curr Microbiol 2019;76:930-8.
37. Hamad GM, Abd El-Baky N, Sharaf MM, Amara AA. Volatile compounds, fatty acids constituents, and antimicrobial activity of cultured *Spirulina* (*Arthrospira fusiformis*) isolated from Lake Mariout in Egypt. ScientificWorldJournal 2023;2023:1-9.
38. Pagnussatt FA, de Lima VR, Dora CL, Costa JA, Putaux JL, Badiale-Furlong E. Assessment of the encapsulation effect of phenolic compounds from *Spirulina* sp. LEB-18 on their antifusarium activities. Food Chem 2016;211:616-23.
39. Abbas HS, Krishnan A, Kotakonda M. Antifungal and antiovarian cancer properties of α Fe(2)O(3) and α Fe(2)O(3)/ZnO nanostructures synthesised by *Spirulina platensis*. IET Nanobiotechnol 2020;14:774-84.
40. Souza MM, Prietto L, Ribeiro AC, Souza TD, Badiale-Furlong E. Assessment of the antifungal activity of *Spirulina platensis* phenolic extract against *Aspergillus flavus*. Science and Agrotechnology 2011;35:1050-8.
41. Soror AS, Ahmed MW, Hassan AE, Alharbi M, Alsubhi NH, Al-Quwaie DA, *et al*. Evaluation of green silver nanoparticles fabricated by *Spirulina platensis* phycocyanin as anticancer and antimicrobial agents. Life (Basel) 2022;12:1493.
42. Ikeda IK, Sydney EB, Sydney AC. Potential application of spirulinain dermatology. J Cosmet Dermatol 2022;21:4205-14.
43. Miranda MS, Cintra RG, Barros SB, Mancini Filho J. Antioxidant activity of the microalga *Spirulina* maxima. Braz J Med Biol Res 1998;31:1075-9.
44. Wu Q, Liu L, Miron A, Klímová B, Wan D, Kuča K. The antioxidant, immunomodulatory, and anti-inflammatory activities of *Spirulina*: An overview. Arch Toxicol 2016;90:1817-40.
45. Stunda-Zujeva A, Berele M, Lece A, Šķesters A. Comparison of antioxidant activity in various *Spirulina* containing products and factors affecting it. Sci Rep 2023;13:4529.
46. Piñero Estrada JE, Bermejo Bescós P, Villar del Fresno AM. Antioxidant activity of different fractions of *Spirulina platensis* protean extract. Farmaco 2001;56:497-500.
47. Gutiérrez-Rebolledo GA, Galar-Martínez M, García-Rodríguez RV, Chamorro-Cevallos GA, Hernández-Reyes AG, Martínez-Galero E. Antioxidant effect of *Spirulina* (*Arthrospira*) maxima on chronic inflammation induced by Freund's complete adjuvant in rats. J Med Food 2015;18:865-71.
48. Bashandy SA, El Awdan SA, Ebaid H, Alhazza IM. Antioxidant potential of *Spirulina platensis* mitigates oxidative stress and reprotoxicity induced by sodium arsenite in male rats. Oxid Med Cell Longev 2016;2016:1-8.
49. Zhang ZH, Yu B, Xu Q, Bai Z, Ji K, Gao X, *et al*. The physicochemical properties and antioxidant activity of *Spirulina* (*Artrhospira platensis*) chlorophylls microencapsulated in different ratios of gum Arabic and whey protein isolate. Foods 2022;11:1809.
50. Wu LC, Ho JA, Shieh MC, Lu IW. Antioxidant and antiproliferative activities of *Spirulina* and chlorella water extracts. J Agric Food Chem 2005;53:4207-12.
51. Dartsch PC. Antioxidant potential of selected *Spirulina platensis* preparations. Phytother Res 2008;22:627-33.
52. Abdel-Daim MM, Farouk SM, Madkour FF, Azab SS. Anti-inflammatory and immunomodulatory effects of *Spirulina platensis* in comparison to *Dunaliella salina* in acetic acid-induced rat experimental colitis. Immunopharmacol Immunotoxicol 2015;37:126-39.
53. Juszkiewicz A, Basta P, Petriczko E, Machaliński B, Trzeciak J, Łuczkowska K, *et al*. An attempt to induce an immunomodulatory effect in rowers with *Spirulina* extract. J Int Soc Sports Nutr 2018;15:9.
54. Calella P, Cerullo G, Di Dio M, Liguori F, Di Onofrio V, Gallè F, *et al*. Antioxidant, anti-inflammatory and immunomodulatory effects of *Spirulina* in exercise and sport: A systematic review. Front Nutr 2022;9:1048258.
55. Rasool M, Sabina EP. Appraisal of immunomodulatory potential of *Spirulina fusiformis*: An *in vivo* and *in vitro* study. J Nat Med 2009;63:169-75.
56. Li J, Zhang Y, Yang S, Lu Z, Li G, Liu J, *et al*. Isolation, purification, characterization, and immunomodulatory activity analysis of α-glucans from *Spirulina platensis*. ACS Omega 2021;6:21384-94.
57. Mao TK, van DE Water J, Gershwin ME. Effect of *Spirulina* on the secretion of cytokines from peripheral blood mononuclear cells. J Med Food 2000;3:135-40.
58. Hamouda RA, Hamza HA, Salem ML, Kamal S, Alhasani RH, Alsharif I, *et al*. Synergistic hypolipidemic and immunomodulatory activity of *Lactobacillus* and *Spirulina platensis*. Fermentation 2022;8:220.
59. Subramaiam H, Chu WL, Radhakrishnan AK, Chakravarthi S, Selvaduray KR, Kok YY. Evaluating anticancer and immunomodulatory effects of *Spirulina* (*Arthrospira*) platensis and gamma-tocotrienol supplementation in a syngeneic mouse model of breast cancer. Nutrients 2021;13:2320.

60. Appel K, Munoz E, Navarrete C, Cruz-Teno C, Biller A, Thiemann E. Immunomodulatory and inhibitory effect of immulina(®), and immunloges(®) in the Ig-E mediated activation of RBL-2H3 cells. A new role in allergic inflammatory responses. Plants (Basel) 2018;7:13.
61. Satyaraj E, Reynolds A, Engler R, Labuda J, Sun P. Supplementation of diets with *Spirulina* influences immune and gut function in dogs. Front Nutr 2021;8:667072.
62. Alam A, Siddiqui MA, Quamri A, Fatima S, Roqaiya M, Ahmad Z. Efficacy of *Spirulina* (Tahlab) in patients of type 2 diabetes mellitus (Ziabetus Shakri): A randomized controlled trial. J Diabetes Metab 2016;7:1-5.
63. Simon JP, Baskaran UL, Shallauddin KB, Ramalingam G, Evan Prince S. Evidence of antidiabetic activity of *Spirulina fusiformis* against streptozotocin-induced diabetic Wistar albino rats. 3 Biotech 2018;8:129.
64. Parikh P, Mani U, Iyer U. Role of *Spirulina* in the control of glycemia and lipidemia in type 2 diabetes mellitus. J Med Food 2001;4:193-9.
65. Oriquat GA, Ali MA, Mahmoud SA, Eid RM, Hassan R, Kamel MA. Improving hepatic mitochondrial biogenesis as a postulated mechanism for the antidiabetic effect of *Spirulina platensis* in comparison with metformin. Appl Physiol Nutr Metab 2019;44:357-64.
66. Hatami E, Ghalishourani SS, Najafgholizadeh A, Pourmasoumi M, Hadi A, Clark CC, *et al*. The effect of *Spirulina* on type 2 diabetes: A systematic review and meta-analysis. J Diabetes Metab Disord 2021;20:883-92.
67. Hannan JM, Ansari P, Azam S, Flatt PR, Abdel Wahab YH. Effects of *Spirulina platensis* on insulin secretion, dipeptidyl peptidase IV activity and both carbohydrate digestion and absorption indicate potential as an adjunctive therapy for diabetes. Br J Nutr 2020;124:1021-34.
68. Gargouri M, Hamed H, Akrouti A, Dauvergne X, Magné C, El Feki A. Effects of *Spirulina platensis* on lipid peroxidation, antioxidant defenses, and tissue damage in kidney of alloxan-induced diabetic rats. Appl Physiol Nutr Metab 2018;43:345-54.
69. Ziyaei K, Abdi F, Mokhtari M, Daneshmehr MA, Ataie Z. Phycocyanin as a nature-inspired antidiabetic agent: A systematic review. Phytomedicine 2023;119:154964.
70. Sadek KM, Lebda MA, Nasr SM, Shoukry M. *Spirulina platensis* prevents hyperglycemia in rats by modulating gluconeogenesis and apoptosis via modification of oxidative stress and MAPK-pathways. Biomed Pharmacother 2017;92:1085-94.
71. Karizi SR, Armanmehr F, Azadi HG, Zahroodi HS, Ghalibaf AM, Bazzaz BS, *et al*. A randomized, double-blind placebo-controlled add-on trial to assess the efficacy, safety, and anti-atherogenic effect of *Spirulina platensis* in patients with inadequately controlled type 2 diabetes mellitus. Phytother Res 2023;37:1435-48.
72. Mazokopakis EE, Starakis IK, Papadomanolaki MG, Mavroeidi NG, Ganotakis ES. The hypolipidaemic effects of *Spirulina* (*Arthrospira platensis*) supplementation in a Cretan population: A prospective study. J Sci Food Agric 2014;94:432-7.
73. Martínez-Sámano J, Torres-Montes de Oca A, Luqueño-Bocardo OI, Torres-Durán PV, Juárez-Oropeza MA. *Spirulina* maxima decreases endothelial damage and oxidative stress indicators in patients with systemic arterial hypertension: Results from exploratory controlled clinical trial. Mar Drugs 2018;16:496.
74. Serban MC, Sahebkar A, Dragan S, Stoichescu-Hogea G, Ursoniu S, Andrica F, *et al*. A systematic review and meta-analysis of the impact of *Spirulina* supplementation on plasma lipid concentrations. Clin Nutr 2016;35:842-51.
75. Torres-Duran PV, Ferreira-Hermosillo A, Juarez-Oropeza MA. Antihyperlipemic and antihypertensive effects of *Spirulina* maxima in an open sample of Mexican population: A preliminary report. Lipids Health Dis 2007;6:33.
76. Rahnama I, Arabi SM, Chambari M, Bahrami LS, Hadi V, Mirghazanfari SM, *et al*. The effect of *Spirulina* supplementation on lipid profile: GRADE-assessed systematic review and dose-response meta-analysis of data from randomized controlled trials. Pharmacol Res 2023;193:106802.
77. Samuels R, Mani UV, Iyer UM, Nayak US. Hypocholesterolemic effect of *Spirulina* in patients with hyperlipidemic nephrotic syndrome. J Med Food 2002;5:91-6.
78. Ngo-Matip ME, Pieme CA, Azabji-Kenfack M, Biapa PC, Germaine N, Heike E, *et al*. Effects of *Spirulina platensis* supplementation on lipid profile in HIV-infected antiretroviral naïve patients in Yaounde-Cameroon: A randomized trial study. Lipids Health Dis 2014;13:191.
79. Cheong SH, Kim MY, Sok DE, Hwang SY, Kim JH, Kim HR, *et al*. *Spirulina* prevents atherosclerosis by reducing hypercholesterolemia in rabbits fed a high-cholesterol diet. J Nutr Sci Vitaminol (Tokyo) 2010;56:34-40.
80. Mohammad M, Karim D, Mehdi M, Marziyeh S, Hadi S, Shila N. The combinatory effect of *Spirulina* supplementation and resistance exercise on plasma contents of adipolin, apelin, ghrelin, and glucose in overweight and obese men. Mediators Inflamm 2022;2022:1-9.
81. Deng R, Chow TJ. Hypolipidemic, antioxidant, and antiinflammatory activities of microalgae *Spirulina*. Cardiovasc Ther 2010;28:e33-45.
82. Hernández-Lepe MA, Wall-Medrano A, López-Díaz JA, Juárez-Oropeza MA, Hernández-Torres RP, Ramos-Jiménez A. Hypolipidemic effect of *Arthrospira* (*Spirulina*) maxima supplementation and a systematic physical exercise program in overweight and obese men: A double-blind, randomized, and crossover controlled trial. Mar Drugs 2019;17:270.
83. Machowiec P, Ręka G, Maksymowicz M, Piecewicz-Szczęsna H, Smoleń A. Effect of *Spirulina* supplementation on systolic and diastolic blood pressure: Systematic review and meta-analysis of randomized controlled trials. Nutrients 2021;13:3054.
84. Ghaem Far Z, Babajafari S, Kojuri J, Mohammadi S, Nouri M, Rostamizadeh P, *et al*. Antihypertensive and antihyperlipemic of *Spirulina* (*Arthrospira platensis*) sauce on patients with hypertension: A randomized triple-blind placebo-controlled clinical trial. Phytother Res 2021;35:6181-90.
85. Miczke A, Szulińska M, Hansdorfer-Korzon R, Kręgielska-Narożna M, Suliburska J, Walkowiak J, *et al*. Effects of *Spirulina* consumption on body weight, blood pressure, and endothelial function in overweight hypertensive Caucasians: A double-blind, placebo-controlled, randomized trial. Eur Rev Med Pharmacol Sci 2016;20:150-6.
86. Ichimura M, Kato S, Tsuneyama K, Matsutake S, Kamogawa M, Hirao E, *et al*. Phycocyanin prevents hypertension and low serum adiponectin level in a rat model of metabolic syndrome. Nutr Res 2013;33:397-405.
87. Suo Q, Yue Y, Wang J, Wu N, Geng L, Zhang Q. Isolation, identification and *in vivo* antihypertensive effect of novel angiotensin I-converting enzyme (ACE) inhibitory peptides from *Spirulina* protein hydrolysate. Food Funct 2022;13:9108-18.
88. Zheng J, Wang J, Pan H, Wu H, Ren D, Lu J. Effects of IQP, VEP and *Spirulina platensis* hydrolysates on the local kidney renin angiotensin system in spontaneously hypertensive rats. Mol Med Rep 2017;16:8485-92.

89. Suliburska J, Szulińska M, Tinkov AA, Bogdański P. Effect of *Spirulina* maxima supplementation on calcium, magnesium, iron, and zinc status in obese patients with treated hypertension. Biol Trace Elem Res 2016;173:1-6.
90. Villalpando DM, Verdasco-Martín CM, Plaza I, Gómez-Rivas J, de Bethencourt FR, Villarroel M, *et al*. Beneficial effects of *Spirulina* aqueous extract on vasodilator function of arteries from hypertensive rats. Int J Vasc Med 2020;2020:1-9.
91. Carrizzo A, Conte GM, Sommella E, Damato A, Ambrosio M, Sala M, *et al*. Novel potent decameric peptide of *Spirulina platensis* reduces blood pressure levels through a PI3K/AKT/eNOS-dependent mechanism. Hypertension 2019;73:449-57.
92. Szulinska M, Gibas-Dorna M, Miller-Kasprzak E, Suliburska J, Miczke A, Walczak-Gałezewska M, *et al*. *Spirulina* maxima improves insulin sensitivity, lipid profile, and total antioxidant status in obese patients with well-treated hypertension: A randomized double-blind placebo-controlled study. Eur Rev Med Pharmacol Sci 2017;21:2473-81.
93. Mahmoud YI, Shehata AM, Fares NH, Mahmoud AA. *Spirulina* inhibits hepatocellular carcinoma through activating p53 and apoptosis and suppressing oxidative stress and angiogenesis. Life Sci 2021;265:118827.
94. Koníčková R, Vaňková K, Vaníková J, Váňová K, Muchová L, Subhanová I, *et al*. Anti-cancer effects of blue-green alga *Spirulina platensis*, a natural source of bilirubin-like tetrapyrrolic compounds. Ann Hepatol 2014;13:273-83.
95. Czerwonka A, Kaławaj K, Sławińska-Brych A, Lemieszek MK, Bartnik M, Wojtanowski KK, *et al*. Anticancer effect of the water extract of a commercial *Spirulina* (*Arthrospira platensis*) product on the human lung cancer A549 cell line. Biomed Pharmacother 2018;106:292-302.
96. Tajvidi E, Nahavandizadeh N, Pournaderi M, Pourrashid AZ, Bossaghzadeh F, Khoshnood Z. Study the antioxidant effects of blue-green algae *Spirulina* extract on ROS and MDA production in human lung cancer cells. Biochem Biophys Rep 2021;28:101139.
97. Oh SH, Ahn J, Kang DH, Lee HY. The effect of ultrasonificated extracts of *Spirulina* maxima on the anticancer activity. Mar Biotechnol (NY) 2011;13:205-14.
98. Ge Y, Kang YK, Dong L, Liu LH, An GY. The efficacy of dietary *Spirulina* as an adjunct to chemotherapy to improve immune function and reduce myelosuppression in patients with malignant tumors. Transl Cancer Res 2019;8:1065-73.
99. Uppin V, Dharmesh SM, Sarada R. Polysaccharide from *Spirulina platensis* evokes antitumor activity in gastric cancer cells via modulation of galectin-3 and exhibited Cyto/DNA protection: Structure-function study. J Agric Food Chem 2022;70:7058-69.
100. Saberi S, Khoobi M, Alaeddini M, Etemad-Moghadam S, Jamshidloo R, Mohammadpour H, *et al*. The effect of photodynamic therapy on head and neck squamous cell carcinoma cell lines using *Spirulina platensis* with different laser energy densities. Photodiagnosis Photodyn Ther 2022;37:102688.
101. Śmieszek A, Giezek E, Chrapiec M, Murat M, Mucha A, Michalak I, *et al*. The Influence of *Spirulina platensis* filtrates on caco-2 proliferative activity and expression of apoptosis-related microRNAs and mRNA. Mar Drugs 2017;15:65.

Review Article

Banṭāfulun (*Potentilla reptans* L.): An Overlooked Unani Medicinal Herb – Benefits and Recent Research Insights

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Abstract

Banṭāfulun (*Potentilla reptans* L.), commonly known as creeping cinquefoil or creeping tormentil, is a perennial runner in the family *Rosaceae* and native to the Northern Temperate Zone encompassing Europe, northern and western Asia, and several regions of Afghanistan, Kashmir and the North China, Japan, and Abyssinia. Although it is one of the least studied species of the *Potentilla* genus, it has a long history of use in traditional medicine. The aerial and rhizome parts of the plant are used in the Unani system of medicine to treat a plethora of diseases such as ulcers, melancholic disorders, syphilis, hard swellings, hemorrhages, lymphadenopathy, erysipelas, edema, arthritis, chest pain, otalgia, toothache, and wound healing. Phytochemical studies have revealed the presence of various bioactive compounds, predominantly phenols. These include flavonoids and their glucosides, catechins, and tannins. *P. reptans* L possesses various biological properties such as antidiarrheal, antiulcerogenic, antineoplastic, antiviral, antibacterial, antihyperglycemic, anti-inflammatory, antispasmodic, hepatoprotective, and antioxidant effects. Modern pharmacological studies have confirmed several traditional claims and demonstrated antimicrobial, antioxidant, cardioprotective, and cytotoxic activities. In addition, *P. reptans* shows potential in the treatment of arthralgia, sciatica, and toothache. The traditional and pharmacological significance of *P. reptans* highlights its potential as a therapeutic agent and warrants further scientific exploration and validation of its bioactivities through modern research methods. This review highlights the distribution of the plant, its traditional uses, phytochemical profile and pharmacological activities, and its potential as a versatile therapeutic agent. The results highlight the need for further intensive research to fully explore the medical applications and molecular mechanisms underlying the bioactivities of *P. reptans*.

Keywords: *Banṭāfulun, lesser known, Potentilla reptans L., Unani Medicine*

Introduction

Traditional medical systems such as Unani, Ayurveda, Siddha, and Chinese medicine have existed since ancient times. All ideas of alternative medicine are based on the historical and philosophical relationships between nature, life, health, and disease.[1] These medical systems have always played a significant role in meeting global healthcare needs.[2] They are still doing this and will continue to play an important role in the future.[3] In recent years, medicinal plants found in natural regions have attracted increasing scientific and commercial interest.[4] According to the World Health Organization (WHO), there are approximately 300,000 plant species worldwide, but only 15% of them have been studied for their pharmacological potential.[5] Therefore, it is time to research lesser-known plants for their pharmacological effects. Some lesser-known drugs are *Bisheri buti* (*Aerva lanata* L.),[6,7] *Bukan Booti* (*Lippia nodiflora* L.),[8] *and Chaksīnī* (*Peristrophe bicalyculata*).[9] One such obscure drug is *Bantafulun* which belongs to the genus *Potentilla* in the *Rosaceae* family. *Potentilla* species have long been used in traditional medicine to cure various diseases.[10] *Potentilla* species have received the names Hetaphyllon, Pentaphyllon, Septifolium, and Quinquefolium in the Greek and Latin languages.[11] In the Turkish flora, the genus includes about 53 species and roughly 500 species worldwide. *Banṭāfulun* (*Potentilla reptans* L.) is a perennial herbaceous plant with a thick vertical rhizome [Figure 1]. It is native to many parts of Serbia. *P. reptans* is the least studied species of the genus *Potentilla*.[12] In Europe, it is referred to by several names, including creeping cinquefoil and creeping tormentil. *P. reptans* L. is well known in herbal medicine and has been used in traditional medicine for thousands of years. This herb is praised

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for its ability to do anything to protect against witches and cure illness.[13] Aerial and rhizome parts of this plant are used for medicinal purposes.[13-15] It possesses antidiarrheal, antiulcerogenic, antineoplastic, antiviral, antibacterial, antihyperglycemic, anti-inflammatory, antispasmodic, hepatoprotective, and antioxidant properties. Its aerial parts

Figure 1: Some images of *Banṭāfulun* (*Potentilla reptans* L.) from Srinagar, Kashmir (a) Prostrate herb, (b) Flower, (c) Leaf dorsal aspect, (d) Plant with root (stolon), (e) Flower and calyx, (f) Leaf ventral aspect

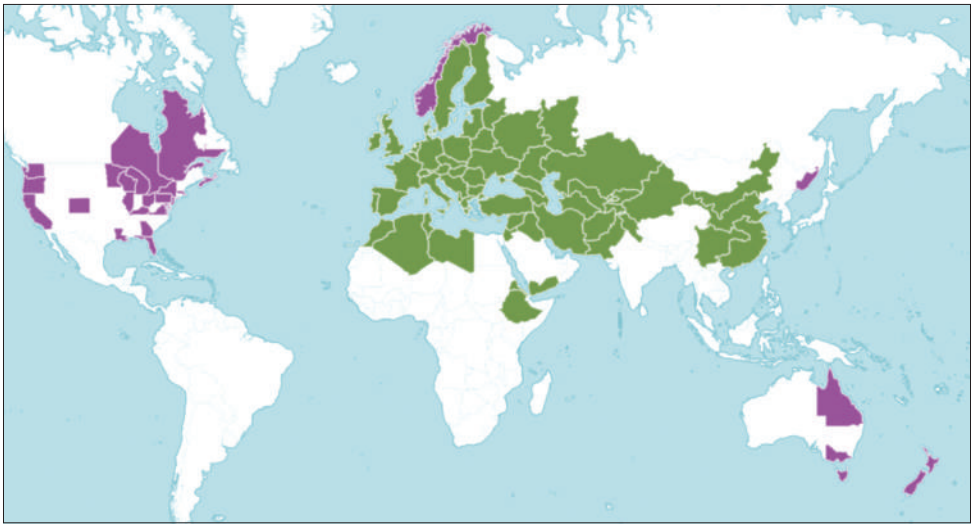

Figure 2: Distribution of *Potentilla reptans* L.

are used to treat uterine fibroids, tumors, hemorrhoids, stomach and intestinal inflammation, diarrhea, liver disease, and eye inflammation.[16] In the Unani system, it is administered for the treatment of insidious ulcers, melancholic diseases, syphilis, hard swellings, hemorrhages, lymphadenopathy, erysipelas, edema, arthritis, chest pain, liver pain, otalgia, toothache, sores etc. Several chemicals, mainly phenols, have been identified from the aerial parts of *P. reptans*. Flavonoids and their glucosides (kaempferol, quercetin, rutin, quercetin-3-0-glucoside, kaempferol-3-O-glucoside, apigenin-7-O-glucoside, luteolin-7-O-glucoside, apigenin-7-O-glucoside, and luteolin-7-O-glucoside) as well as catechins and tannins.[17]

Materials and Methods

Classical Unani literature was explored to determine the temperament, medicinal properties, and therapeutic uses of *Banṭāfulun*. To compile all available data on his phytochemical and pharmacological studies, published works accessible through PubMed, Science Direct, and Google Scholar were reviewed. Every relevant article including review articles, research studies, and classical Unani literature has been cited. Using plants of the World Online, supported by the Royal Botanic Gardens, Kew, the scientific name of the plant was verified online at https://powo.science.kew.org/.[18] Standard Unani Medical Terminology, published by the Central Council for Research in Unani Medicine in collaboration with the WHO served as the basis for defining the relevant Unani terms. Indian medicinal plants, British Indian flora and medicinal herbs with their preparations were used for botanical descriptions.

Jā-i-Waqū'' (Distribution)

This plant is found in North temperate zone of Europe, North and West Asia, Afghanistan, Kashmir, North China, Japan, and Abyssinia [Figure 2].[19-21]

Botanical Description

P. reptans L. belongs to the *Rosaceae* family. The genus name, *Potentilla*, refers to the alleged medicinal value of plants in this genus and means "powerful, despite its small size." The specific epithet *reptans* refers specifically to creeping or crawling (in this case, at least, not necessarily as quickly as a reptile).[22] *P. reptans* L. is a perennial and creeping herb, rootstock is woody, runners 30–60 cm, slender, leafy at the nodes. The height of this plant is approximately 15 cm; leaves are digitate, divided into 5 leaflets, stalked. Stalks 2.5–15 cm long, slender, leaflets 2.5 cm long, obovate, or inversely lanceolate, tooth, blunt at the tips, membranous, sometimes with very short stalks, stipules small, oblong, entire; flowers 1.3–2 cm diameter, erect solitary in the axils of the leaves, flower-stalk 2.5–10 cm long. One - Flowered, naked. Petals obcordate, golden-yellow. Calyx lobes are broad or narrow, and sharp-pointed.[21]

Characteristics of *Banṭāfulun* (*Potentilla reptans* L)[23,24]

The characteristics of *Banṭāfulun* (*P. reptans* L) are mentioned in Table 1.

Taxonomical classification[25]

Taxonomical classification is mentioned in Table 2.

Description in Unani Literature

Banṭāfulun is one of the lesser-known drugs of Unani medicine mentioned by various scholars such as Ibn Sina, Ibn Baitar and Najmul Ghani in their treatise namely *Al-Qanūn Fil-Tibb, Al-Jami Li Mufradat al-Advia Wa al-Aghzia, Khazainul Advia*. It is commonly known as Cinquefoil, and grows near lakes or in damp places. The leaves of the plant resemble that of mint (*Mentha arvensis*). The leaf margins are toothed and blunt at the tip, each branch containing five leaves, sometimes this number is increased. The flowers are saffron-white (yellow); the root is long and red. The roots and leaves are widely used to treat various diseases such as epilepsy, diarrhoea, toothache, jaundice, haemorrhoids, bleeding gums etc.[14,15,26] Dioscorides (1st Century CE) has recommended taking its

Table 1: Characteristics of *Banṭāfulun* (*Potentilla reptans* L.)

Characteristics	Remarks
Habitat	Terrestrial
Flower petal colour	Yellow
Leaf type	The leaves are compound (made up of two or more discrete leaflets
Leaf arrangement	Alternate: There is one leaf per node along the stem
Leaf blade edges	The edge of the leaf blade has teeth
Flower symmetry	There are two or more ways to evenly divide the flower (the flower is radially symmetrical)
Number of sepals, petals or tepals	There are five petals, sepals, or tepals in the flower
Fusion of sepals and petals	Both the petals and sepals are separate and not fused
Stamen number	13 or more
Fruit type	The fruit is dry but does not split open when ripe
Fruit length (mm)	1.3–1.6

Table 2: Shows taxonomical classification

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Rosales
Family	*Rosaceae*
Genus	*Potentilla*
Species	*Potentilla reptans*

leaves with pepper (*Piper nigrum* L.) and wine to treat periodic fever (malaria).[27] Ibn Sina recommended taking its leaves along with wine for 3 days to treat epilepsy.[26] Ibn Baitar and Najmul Ghani have mentioned that the leaves of *Banṭāfulun* are very much effective in treating epilepsy when taken for 30 days.[14,15]

***Mutarādifāt* (vernacular names)[14,15,26]**

- Arabic: *Dhukhamsa al-Aqsam, Dhukhamsa al-Ajnah*
- English: Cinquefoil, five-finger-grass, five-leaved-grass
- Greek: *Telaqiyūn, Bantayatīs, Bantadaqtiran*.

***Ajzā-i-Musta'mila* (parts used)[14,15,26]**

Berg (leaves) and *Jad* (root).

***Mizāj* (temperament)**

The *Mizāj* (temperament) of *Banṭāfulun* (*P. reptans* L.) is considered dry in 3°.[14,15]

***Miqdār Khūrāk* (dose)**

It is used in the quantity of 3–10 g per orally.

***Af'āl* (pharmacological actions)**

Dafi-i-Ḥumma (antipyretic), *Musakkin* (analgesic), *Muḥallil* (resolvent), *Mudirr-i-Bawl* (diuretic), *Mufattit-i-Ḥaṣā* (lithotriptic), *Nāfi Sar'* (antiepileptic), *Qabḍ* (astringent). It is highly desiccant and without sharpness, pungency, and irritation.[14,15]

***Isti'mālāt* (therapeutic uses)**

It is used for the treatment of *Ākla* (creeping ulcers), *Amrāḍ Sawdāwiyya* (melancholic diseases), *Ātashak* (syphilis), *Awarām-i-Ṣulab* (hard swellings), *Baras* (vitiligo), *Bawāsīr* (haemorrhoids), *Dākhis* (whitlow), *Ḥummā al-Lail* (nocturnal fever), *Ḥummā al-Ghib* (bilious fever), *Ḥummā al-Ruba* (quartan fever), *Irq al-Nasa* (sciatica), *Istisqā* (ascites), *Ishāl* (diarrhoea), *Jarayān al-Dam* (hemorrhage), *Judham* (leprosy), *Kharish* (itching), *Khanāzīr* (lymphadenopathy), *Khushūnat Ḥalaq* (dryness of throat), *Namla* (herpes), *Qaru Ma'i* (hydrocele), *Qūlanj* (colitis), *Qurūḥ Am'a* (intestinal ulcers), *Surkhbāda* (erysipelas), *Udhīmā* (oedema), *Waj' al-Mafāṣil* (arthritis), *Waja' al-Sadr* (chest pain), and *Waja'al-Kabid* (liver pain). *Waja 'al-Udhun* (otalgia), *Waja 'al-Asnan* (toothache), *Yaraqān* (jaundice), *Yaraqān Suddī* (obstructive jaundice), and *Jurūḥ* (wound).[14,15,26]

***Tarkīb Iste'māl* (modes of administration)**

The method of administration of *Banṭāfulun* is mentioned in Table 3.[26]

***Maḍarrat* (toxicity, side effects and adverse effects)**

Harmful to the stomach. Extract of its roots may be fatal.[26]

Table 3: Method of administration in different diseases

Diseases	Method of administration/application
Amrāḍ-i-Rās wa A'ṣāb (brain and nerve diseases)	The leaves are mixed with wine and are to be taken for 3 days in epilepsy
Amrād-i-Riyāḥ (lung diseases)	Gargle with its decoction is useful in roughness of the throat. The root extract is used in lung pain
Amrāḍ-i-Nizām-i-Haḍm (diseases of GIT)	Extract of its root is used orally with salt and honey for a few days to cure *Waj' al-Kabid* (hepatalgia) and *Yaraqān* (jaundice). Its dose is three obolus ($1/10^{th}$ of g)
	Its root is useful in diarrhoea, intestinal ulcers and piles. Its decoction acts similarly
Nazfud Dam (hemorrhage)	It is used as a plaster for hemorrhage
Warm (swelling)	It is plastered on abscesses, scrofula, phlegmatic swellings, whitlow, and itches
Amrāḍ-i-Dehan problems of oral cavity)	Decoction of its root is used in toothache and as mouthwash, it is useful in stomatitis
Ḥummā (fever)	Its leaves are used with honey wine or other wine in quartan, paroxysmal and nocturnal fevers
Amrāḍ-i-Mafāsil (Joint problems)	It is useful in arthralgia and sciatica

***Musliḥ* (corrective)**

Sikanjabīn (a preparation made with vinegar and honey) is used as a corrective.[28]

***Badal* (substitute or alternative)**

Asqūlū Qandariyūn (*Scolopendrium* spp.) for antidote property and *Zumurrud* (emerald) for epilepsy.[15]

Chemical Constituents

Several chemicals, mostly phenolics, have been identified from *P. reptans* aerial parts. Others constituents include; flavonoids and their glucosides (kaempferol, quercetin, rutin, quercetin-3-O-glucoside, kaempferol-3-O-glucoside, apigenin-7-O-glucoside, luteolin-7-O-glucoside, apigenin-7-O-glucoside, luteolin-7-O-glucoside), kaempferol, quercetin, catechins, and tannins (6%–12%).[11,27]

Pharmacological Studies

Anti-ulcerogenic activity

Gurbuz I. (2005) reported anti-ulcerogenic activity that demonstrated that the extract of *Potentilla* leaves given orally showed significant gastric protection against the ethanol-induced gastric ulcer model in rats. Furthermore, healing effects were also confirmed through histopathological examination.[29]

Cytotoxic activity

Radovanovic *et al*. studied the antitumor activity of aqueous extracts (rhizome and aerial parts) of *P. reptans* in 4T1 mouse breast cancer cell line. Aqueous extracts of rhizome and aerial parts showed concentration-dependent cytotoxic effects in the range of tested concentrations. IC50 value of *P. reptans* rhizome extract was 280.51 ± 1.16 µg/mL, IC50 value of *P. reptans* aerial parts extract was 310.79 ± 1.22 µg/m. A significant difference in cytotoxicity among tested concentrations was observed. Rhizome extract of *P. reptans* has slightly higher antitumor activity than aerial parts extract.[12]

Antimicrobial study

Yulian *et al*. (2017) reported the antimicrobial activity of the aerial part of *P. reptans* L. The screening for antimicrobial activity showed that the extract from *P. reptans* was in a concentration of 10 mg/mL. Possessed the highest inhibitory effect on *Listeria monocytogenes*, yeasts, *Candida albicans,* and fungus *Rhizopus* spp.; moderate inhibitory. effect on *Bacillus cereus*, *Proteus vulgaris* and *Pseudomonas aeruginosa*, and insignificant inhibitory effect on *Escherichia coli*, *Enterococcus faecalis,* and fungi *Aspergillus oryzae* and *Penicillium* spp. The growth of *Salmonella* spp., fungi *Aspergillus niger*, *Aspergillus awamori,* and *Fusarium moniliforme* remained unaffected.[17]

Toxicity study

Mincheva *et al*. reported acute and subacute toxicity investigation of *P. reptans* L. aerial parts extract in rats. The lyophilized aqueous extract has LD50 >2000 mg/kg bw and did not show any toxic effects after repeated doses for a 28-day oral toxicity study. The extract showed some antioxidant potential, discerned by decreased MDA production and increased GSH levels when compared to control levels.[27]

Antioxidant effect

Antioxidant effects of *P. reptans* L. were investigated by Enayati *et al*. The aerial parts and roots of this plant were measured by 2,2-diphenyl-1-picrylhydrazyl (DPPH) and Ferric reducing/antioxidant power (FRAP) assay methods and its total phenolics content was estimated by Folin-Ciocalteu assay. *P. reptans* root showed stronger antioxidant activity and total phenolic content compared to the aerial parts.[27,30]

Cardioprotective activity

Enayati *et al*. studied the cardioprotective activity of *P. reptans* root extract on an animal model, in which 35 rats were taken and divided into 5 groups having 7 animals in each. The hearts were subjected to 30 min of ischemia and 100 min of reperfusion. The ischemic preconditioning protocol was applied before the main ischemia. The myocardial infarct size was estimated by triphenyl tetrazolium chloride staining. The hemodynamic parameters, arrhythmia scoring and coronary flow were measured during reperfusion. The total extract of root significantly decreased the infarct size and increased coronary flow in a concentration-dependent manner.[30]

Conclusion

Based on this review, *Banṭāfulun* (*P. reptans* L.) is used in Unani medicine. Is acknowledged for its wide range of therapeutic applications, treating ailments such as vitiligo, hemorrhoids, sciatica, arthritis, jaundice, melancholy, syphilis, creeping ulcers, and many inflammatory and infectious diseases. Its rich phytochemical profile, which includes flavonoids, tannins, catechins, and other phenolics, is responsible for its wide spectrum of bioactivities, which include antimicrobial, antioxidant, anti-inflammatory, cardioprotective, and cytotoxic effects. The extensive pharmacological properties of *P. reptans* demonstrate its potential as a flexible therapeutic agent. However, there are still many open questions about long-term safety, bioavailability, and molecular mechanisms of action. To improve pharmacokinetic parameters such as oral bioavailability and stability, future research should focus on identifying and characterizing active ingredients, elucidating cellular pathways, and developing sophisticated formulations. Its integration into evidence-based medicine and drug development pipelines can be facilitated through the use of modern analytical methods and clinical research.

This analysis highlights *P. reptans* as a promising candidate for new therapeutic applications and provides a starting point for future research on how it could be used to address global health challenges, particularly in the treatment of chronic and multifactorial diseases.

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Conflicts of interest

There are no conflicts of interest.

References

1. Ahmad K, Ahmad H, Hafiz K, Ka H. Neela Thotha (Copper sulphate): An important mineral drug of Unani medicine to be used in the management of various ailments. J Drug Deliv Ther 2021;11:179-84.
2. Ravishankar B, Shukla VJ. Indian systems of medicine: A brief profile. Afr J Tradit Complement Altern Med 2007;4:319-37.
3. Ravishankar B, Shukla VJ. Indian systems of medicine: A brief

profile. Afr J Tradit Complement Altern Med 2007;4:319-37.
4. Roberson E. Medicinal plants at risk. Cent Biol Divers Publ 2008:1-16.
5. Palhares RM, Gonçalves Drummond M, Dos Santos Alves Figueiredo Brasil B, Pereira Cosenza G, das Graças Lins Brandão M, Oliveira G. Medicinal plants recommended by the World Health Organization: DNA barcode identification associated with chemical analyses guarantees their quality. PLoS One 2015;10:e0127866.
6. Girach R, Brahmam M, Misra M, Ahmed M. Some Less-Known Medicinal Plants In Relation To Unani System Of Medicine From District Bhadrak, Orissa; 2000.
7. Kalam MA, Mariyam Z, Sana M, Ismail BA. Bishari booti (*Aerva lanata* (L.) Juss. Ex Schult): Ethanomedicinal importance of a valuable plant from Mother Nature. Eur J Pharm Med Res 2022;9:440-4.
8. Kalam MA, Ahmad G, Munshi YI, Ahmad S. Bukan Booti (*Lippia nodiflora* L.): A lesser-known Unani Drug. Hipp J Unani Med 2016;11:131-9.
9. Kalam MA, Ahmad N. Chaksini (*Peristrophe bicalyculata*): A comprehensive review on a lesser-known Herb of Unani Medicine. Indian J Unani Med 2022;15:27-32.
10. Uysal S, Zengin G, Locatelli M, Bahadori MB, Mocan A, Bellagamba G, *et al*. Cytotoxic and enzyme inhibitory potential of two *Potentilla* species (*P. speciosa* L. and *P. reptans* Willd.) and their chemical composition. Front Pharmacol 2017;8:290.
11. Tomczyk M, Latté KP. Potentilla – A review of its phytochemical and pharmacological profile. J Ethnopharmacol 2009;122:184-204.
12. Radovanovic AM, Cupara SM, Popovic SL, Tomovic MT, Slavkovska VN, Jankovic SM. Cytotoxic effect of *Potentilla reptans* L. rhizome and aerial part extracts. Acta Pol Pharm 2013;70:851-4.
13. Interesting Benefits of Potentilla Reptans | Organic Facts. Available from: https://www.organicfacts.net/health-benefits/herbs-and-spices/potentilla-reptans.html [Last accessed on 2025 Jan 14].
14. Baitar I. Al-Jami al-Mufradat al-Advia va al-Aghzia. Vol 1. New Delhi: Central Council for Research in Unani Medicine; 1985. Pp-292, 293.
15. Ghani N. Khazinul Adwiya. Vol II. Central Council for Research in Unani Medicine, Ministry of Health and Family Welfare, Govt. of India; 2010. Pp-427,428.
16. Lincheva VB, Petkova NT, Ivanov IG. Optimization of biologically active substances extraction process from *Potentilla reptans* L. aerial parts. J Appl Pharm Sci 2017;7:174-9.
17. Yulian T, Lincheva VB, Petkova NT, Nikolova R, Vrancheva R, Ivanov I. Antimicrobial activity of extract from Aerial Parts of Potentilla Potentilla reptans L.. Industrial Technologies. 2017; 4:37-43.
18. Plants of the World Online | Kew Science. Royal Botanic Gardens, Kew; 2023. Available from: https://powo.science.kew.org/. [Last accessed on 2025 Jan 16].
19. Govaerts R, Nic Lughadha E, Black N, Turner R, Paton A. The world checklist of vascular plants, a continuously updated resource for exploring global plant diversity. Sci Data 2021;8:215.
20. Chepinoga V, Barkalov V, Ebel A, Knyazev MS, Baikov KS, Bobrov AA, *et al*. Checklist of vascular plants of Asian Russia 2024;13:3-310.
21. Basu KK. Indian Medicinal Plants. 2nd ed. Delhi: Periodical Expert Book Agency; 2012.
22. Kumari S, Seth A, Sharma S, Attri C. A holistic overview of different species of Potentilla: A medicinally important plant along with their pharmaceutical significance: A review. J Herb Med 2021;29:100460.
23. India Flora Online. Available from: https://indiaflora-ces.iisc.ac.in/herbsheet.php?id=9691&cat=13. [Last accessed on 2025 Jan 14].
24. *Potentilla reptans* (creeping cinquefoil): Go Botany. Available from: https://gobotany.nativeplanttrust.org/species/potentilla/reptans/. [Last accessed on 2025 Jan 14].
25. USDA Plants Database Plant Profile General. Available from: https://plants.usda.gov/plant-profile/PORE6 [Last accessed on 2025 Jan 14].
26. Sina I. Al-Qanun Fil-Tibb. Deptartment of Islamic Studies. Vol II. Delhi: Jamia Hamdard; 1998.
27. Mincheva I, Simeonova R, Vitcheva V, Kozuharova E. Acute and subacute toxicity investigation of *Potentilla reptans* L. aerial parts extract in rats. Comptes Rendus L'Académie Bulg Sci 2018;71:1200-206.
28. Khan MA. Al Aksīr. Vol I. New Delhi: Ajaz Publishing House; 2003.
29. Gurbuz I, Ozkan AM, Yesilada E, Kutsal O. Anti-ulcerogenic activity of some plants used in folk medicine of Pinarbasi (Kayseri, Turkey). J Ethnopharmacol 2005;101:313-8.
30. Enayati A, Khori V, Saeedi Y. Antioxidant activity and cardioprotective effect of *Potentilla reptans* L. via ischemic preconditioning (IPC). Res J Pharmacogn 2019;6:19-27.

Review Article

Unveiling Medicinal Potential of *Nīlam* (Blue Sapphires) Considering Unani Medicine

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Abstract

Sapphire is one of the mineral corundum which because of its blue color is known as "*Nīlam*." This is an extremely fine, high-quality gemstone used to make jewelry. It is brilliance and heavenly blue color are highly captivating. References to this gem can be found in ancient texts. Prophet Solomon had a throne made of sapphire. The Ten Commandments given to Prophet Moses were engraved on sapphire slabs. The Greeks regarded it with great reverence as it was associated with their deities. In the Unani system of medicine, mineral-origin drugs have been used to treat diseases. Sapphire has been extensively documented to have exhilarant, cardio-tonic, brain-tonic, blood-purifier, and antidote properties. It has been used in treating cases of epilepsy, anxiety, and palpitations effectively since ages. The objective of this article is to explore the hidden medicinal properties of *Nīlam* (blue sapphire) according to the Unani perspective recorded by eminent Unani physicians in classical literature.

Keywords: *Corundum, exhilarant, gemstones, Nīlam, sapphire, Unani medicine*

Introduction

The pharmacopeia of the Unani system of medicine is vast, enriched with more than 2000 medicines derived from various herbal, mineral, and animal sources.[1] The great scholar of Unani Medicine *Rhazes* (855-925) was the one who initially classified *Materia medica* into animal, mineral, and plant origin.[2] Among minerals, gemstones such as *Pukhrāj*, *Marjān*, *Zumurrud*, and *Lājward* have been used for their healing properties since ancient times and have been treasured for their luster and presumed benefits by humans throughout history.[3-6] Sapphire is a variety of the mineral corundum which is reddish blue to violet-blue and is simply known as "blue sapphire." Corundum of any other color (except red, which is ruby) is known as "fancy sapphires."[7] Because of its blue color and resemblance to *Yāqūt*, the people of Persia named it "*Yāqūt-ī-Arzaq*."[8] It is the third most popular colored stone (after emerald and ruby).[11] In markets, natural as well as artificially made sapphires are available which are distinguished by some identification techniques. Sapphires can be cut only by diamonds; sapphires appear dull in artificial light and if they are immersed in water, their color does not appear homogenous due to natural impurities present in them while artificial sapphires look perfectly colored.[9]

Materials and Methods

A thorough literature survey was done using numerous authentic publications from the years 1932–2022, both printed and electronic for the collection of data on types of *Nīlam*, its therapeutic uses in Unani system of medicine (USM), and its mineralogy. Google Scholar, PubMed, Science Direct, and Research Gate were searched as online sources and classic Unani references such as *Makhzanul Mufradāt*, *Bustānul Mufradāt*, and *Khazāinul Advia* were consulted. Appropriate Unani terminologies were taken from the Standard Unani Medical Terminology published by CCRUM in collaboration with the World Health Organization.

Observation

Mutarādifāt (vernacular names)

Arabic:	*Yāqūt Arzaq*, *Yāqūt Kabūd*.[10]
English:	Blue sapphire.[11]
Hindi:	*Nīlā*, *Nīm*, *Nīlamanī*.[12,13]
Latin:	*Saphirus*.[12]

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Persian: *Yāqūt Kasra*, *Yāqūt Kabūd*, *Yāqūt Arzaq*, *Sāfir*.[9,13]

Punjabi: *Nīlam*.[8]

Sanskrit: *Shauri Ratan*, *Nīla*, *Mahā Nīl*, *Saqnīl*, *Indar-Nīl*.[11,12]

Description and historical significance of sapphire

The stone is called "*Nīlam*" (Sapphire) because of its blue color [Figure 1]. This is an extremely fine, high-quality gemstone often used to make jewelry. It is brilliance and heavenly blue color are highly captivating. In general, it has fewer flaws in comparison to other gemstones. The dark blue-colored variety is referred to as "*Narr*" (male), and the light-colored variety is called "*Mādda*" (female).[9] *Najmul Ghani* mentioned in his book that it is sweet and tangy in taste,[10,14] but according to *Hakim Abdul Hakim*, it is tasteless.[15]

References to this gem can be found in ancient texts of Hindu and Jewish traditions. Prophet Solomon had a throne made of sapphire. The Ten Commandments given to Prophet Moses were engraved on sapphire slabs. The Greeks regarded it with great reverence as a gem associated with deities (Apollo).[9,12] Recently, in July 2021, the world's largest sapphire cluster was discovered in the Rathnapura region of Sri Lanka, weighing 210 kg or 2.5 million carats.[8]

Occurrence

Blue sapphires are found in various parts of the world, including Burma, Siam, Sri Lanka, Australia, India, and Kashmir. In Austria, Madagascar, America, and Russia, sapphires of other colors are also found.[13]

Figure 1: Nīlam (blue sapphire) stone in different forms

***Mizāj* (temperament)**

Regarding its temperament, there is a discrepancy among scholars, it is considered *Hār* (hot) in the 1st degree and *Yābis* (dry) in the 3rd degree.[10,15] However, some scholars recorded its temperament as *Bārid* (Cold) and *Yābis* (Dry) in 2nd degree.[13]

***Af'āl* (actions) *wa Khawās* (characteristics)**

It has *Mufarriḥ* (exhilarant), *Muqawwī Dimāgh* (brain tonic), *Muqawwī Qalb* (cardiac tonic) *Theriac* (antidote), *Muṣaffī Dam* (blood purifier), *Taḥaffuz Harārat-i-Gharīziyya* (protects innate heat), *Muqawwī Quwwa-i-Ra'isa* (strengthen vital forces).[15] *Musakkin* (refrigerant), *Muqawwī Basar* (sharpens vision) and *Muqawwī Ām* (general body tonic), *Mujaffif* (desiccative).[16] *Dāfi' Ḥumma (*anti-pyretic) and *Muqawwi-Bāh* (approdisiac) properties.[9] Its main actions are *Mufarriḥ* (exhilarant) and *Muqawwī Qalb* (cardiotonic).[12,15]

Therapeutically, it has been used to treat diseases such as *Sar'* (Epilepsy), *Ghabrāhat* (Anxiety), *Khafaqān* (Palpitations), *Ṭa'ūn* (Plague), *Jarayān* (Hemorrhage),[15,16] *Dama* (asthma),[10] *Su'āl* (cough), and *Bawāsīr* (hemorrhoids).[12]

***Tarkīb-i-Iste'māl* (methods of administration)**

In USM, gemstones are used as medicine in the form of *Kushta* (Calyx form) and *Surma* (collyrium) for local application in the eyes. It is also worn as jewelry for its medicinal benefits.[8] The uses of *Nīlam* to treat different ailments are presented in Table 1.

Table 1: Therapeutic uses of *Nīlam*

Systems	Directions of use
Amrāḍ-i-Dimāgh wa A'sāb (diseases of the brain and nerves)	Inhaling the fragrance of sapphires is beneficial for epilepsy, anxiety, palpitations, and plague[15]
Amrāḍ-i-Chashm (eye diseases)	Its collyrium is applied to the eyes, which strengthens the vision and protects the eyes[15]
	The view through this gem is very soothing and beneficial for patients with weak eyesight[9]
Amrāḍ-i-Dandān, Liththa wa Dahan (diseases of teeth, gums, and buccal cavity)	The stone is kept in the mouth to get rid of halitosis (bad breath) and acts as a mouth freshener. It also quenches thirst[15]
Amrāḍ-i-Qalb wa Dawrān-i-Khūn (diseases of heart and blood)	Holding it in the mouth is exhilarating, strengthening the heart[15] and preventing clot formation in the vessels[9]
Du'f-i-Bāh (sexual weakness)	Wearing it around the waist enhances sexual power[9]

***Miqdār Khūrāk* (dosage)**

375 mg–750 mg[15,16] orally in powder form.

The dosage of *Kushta* (Calyx) is 62 mg–125 mg orally.[12]

Salāya (fine powder) 250 mg–500 mg.[12]

***Maḍarrat* (harmful effects)**

Its excess use is not good for individuals of hot temperament.[15]

***Musleh* (correctives)**

Yāqūt Safed (white Ruby), cold and wet items correct its harmful effects.[15]

***Badal* (substitute)**

Yāqūt Surkh (Red Ruby) or *Yāqūt Zard* (Yellow).[10,15]

***Nisbat-i-Sitāra* (associated star)**

Blue sapphires are said to be associated with the planet *Mirrīkh* (Mars).[15]

Murakkabat (compound formulations)

As shown in Table 2, for the compounds and their uses that have *Nīlam* as one of the important ingredients.

Specifications of blue sapphires

Chemical formula: Be3Al2SiO6.[11] Chemically, sapphires are oxides of alumina. It contains traces of iron as well.[9] In terms of hardness, it comes next to a diamond and can only be cut with a diamond. Its hardness is rated at 9 on the Moh scale.[8] The details are presented in Table 3.

Conclusion

Sapphires are heavenly blue gemstones, known for their hardness has been valued since immemorial times. It is one of the precious gemstones used in compound formulations to treat various diseases of the heart and eyes. Despite its historical medicinal use, scientific exploration is still scarce to evaluate its pharmacological effects. This article is prepared to highlight the hidden medicinal uses of stone and further necessary research needed.

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Table 2: Compound formulations have *Nīlam* as one of the important ingredients, their dose and method of administration and indication

Compound formulation containing sapphire as one of the ingredients	Dosage and mode of administration	Indications
Ḥabb-i-Jawāhar	1–2 pills with 4 g *Ma'jūn Jālīnūs Lu'luwī* (oral)	In the weakness of vital organs, postillness debility, bleeding, and diarrhea[17,18,21]
Jawāhar Mohrā	60 mg (oral)	In the weakness of vital organs and decreased innate heat[19,20]
Ma'jūn Murawwaḥ al-Arwāḥ	1 g with 250 mL milk or 60 mL of *Mā ul-Laḥm do Ātsha* (oral)	In sexual weakness and weakness of vital organs[19]
Iksīr Jawhar	30–60 mg with butter (oral)	Palpitations, cardiac disorders, weakness of vital organs[21]

Table 3: Characteristics of blue sapphires[11]

Properties	Values
Alumina	99%
Hardness	9°
Specific gravity	395°
Melting Point	2040°
Titanium Oxide	1%
Refractive index	176 radians

Conflicts of interest

There are no conflicts of interest.

References

1. Unani Medicine. Encyclopaedia Britannica; 2019. Available from: https://www.britannica.com/science/Unani-medicine. [Last accessed on 2024 Aug 19].
2. Schuh CP. Mineralogy & Crystallography: On the History of the Sciences from Beginning through 1919. Tucson Arizona: Curtis Schuh; 2007. p. 33-4.
3. Kalam MA, Uvais M, Snober K, Bisma A, Naureen N, Toyiba I. *Pukhraj* (topaz): A review on medicinal utility in perspective of Unani medicine. Indian J Unani Med 2024;17:110-4.
4. Kalam MA, Yasmin S, Naved M, Haseeb A. *Marjān* (Coral): A valuable Unani medicine having multifarious medicinal uses. Acta Sci Pharm Sci 2022;6:11-7.
5. Kalam MA, Rahman S. *Lājward* (Lapis lazuli): Medicinal potential of a high-value gemstone in the light of Unani medicine IJPPR 2020;20:389-99.
6. Kalam MA, Wahid B, Ahmad A, Huzaifa A, Rahman S, Haseeb A. *Zumurrud* (emerald): Medicinal potential of a gemstone from Jawaharat-i-tis'a (navratan), in the perspective of Unani medicine. J Adv Res Ayurveda Yoga Unani Siddha Homeopathy 2021;8:5-9.
7. Blue Gemstones: Sapphire, Turquoise, Aquamarine and more. Available from: https://geology.com. [Last accessed on 2024 Aug 19].

8. Kalam MA. Jawahirat-Tisa (Nawratan) Aur Unke Tibbi Fawaed. Patna: Markazi Publications; 2022. p. 45-51.
9. Zubayda FH. Qīmtī Pathhar aur Āp. Lahore: Gurdizi Publishers; 1982. p. 29-36.
10. Ghani HN. Khazāinul-Advia. 1st ed., Vol. 6. New Delhi: Idara Kitab us Shifa; 2010. p. 471.
11. Abbas A. Advia Maʿdaniya. New Delhi: Aijaz Publishing House; 2004. p. 123.
12. Goswami HR. Bayānul Adviā. New Delhi: Idara Kitab us Shifa; 2019. p. 475-6.
13. Nabi GN. Khawāsul Advia, Makhzan-ul Mufradat wa Murakkabāt. 2nd ed. New Delhi: Central Council for Research in Unani Medicine. Ministry of H&W, Government of India; 2007. p. 242.
14. Khan MA. Muhīt-i-Azam. Vol. 4. New Delhi: Central Council for Research in Unani Medicine; 2018. p. 843.
15. Hakim MA. Bustān al Mufradāt. New Delhi: Idara Kitab us Shifa; 2011. p. 341.
16. Kabiruddin M. Makhzan al-Mufradāt. New Delhi: Aijaz Publishing House; 2014. p. 404.
17. Kabiruddin M. Bayāḍ-i-Kabīr. Vol. 2. New Delhi: Idara Kitab us Shifa; 1935. p. 30, 31.
18. Qasmi IA. Dastūrul Murakkabāt. Aligarh: International Printing Press; 2012. p. 79.
19. Anonymous. National Formulary of Unani Medicine. Part. 5. New Delhi: Central Council for Research in Unani Medicine; 2008. p. 95, 98, 149.
20. Anonymous. Hamdard Pharmacopoeia of Eastern Medicine. Delhi: Sri Satguru Publications; 1997. p. 92.
21. Abdullah HM. Kanzul Murakkabāt. New Delhi: Aijaz Publishing House; 1998. p. 32.

Original Article

Clinical Evaluation of Unani Formulations as Adjunct Therapy/Add-on Therapy Simultaneously with the Allopathic Treatment (Regimen Specific) in COVID-19 Patients

Abstract

Background: This randomized controlled study aimed to evaluate the efficacy of a test drug on clinical outcomes and inflammatory biomarkers in COVID-19 patients. **Methodology:** A total of 93 patients were screened, and 84 met the inclusion criteria. Participants were randomized into two groups: test Group A (n = 41) and control Group B (n = 43). After accounting for dropouts, 40 patients from each group completed the protocol therapy. The mean age of participants was 40.55 ± 2.096 years in Group A and 39.75 ± 1.944 years in Group B. **Results:** Significant reductions in inflammatory markers were observed in both groups, with greater improvements in the test group. In Group A, C-reactive protein (CRP) levels decreased from 14.133 ± 4.361 to 6.779 ± 1.331, while in Group B, CRP levels decreased from 17.5504 ± 4.281 to 4.0236 ± 0.9165. Serum ferritin and D-dimer levels also showed substantial reductions, with Group A achieving statistically significant improvements ($P < 0.0001$ for ferritin and $P = 0.0117$ for D-dimer). Although lactate dehydrogenase and immunoglobulin-G levels showed favorable trends, the changes were not statistically significant. interleukin-6 levels decreased significantly in Group A, suggesting that the test drug may help prevent cytokine storms. **Conclusion:** The test drug demonstrated efficacy in modulating inflammatory responses and improving clinical outcomes in COVID-19 patients. Its immune-modulatory and anti-inflammatory properties, as highlighted in classical Unani literature, likely contributed to these effects. Further large-scale studies are needed to confirm these findings and explore broader applications of the test drugs.

Keywords: *COVID-19, Habbe Tabasheer, Habbe Zahar Mohra, immunomodulation, inflammatory*

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Introduction

In December 2019, a new disease with pneumonia-like symptoms was spreading throughout Wuhan in China. The disease was called novel coronavirus disease or COVID-19 and was caused by the virus SARS-CoV-2. Within a span of a few days, this disease became a global threat and was termed a pandemic by the World Health Organization on March 11, 2020; since then, the disease had affected more than 1.5 crore people worldwide and around 6.9 lakh people in India as of July 5, 2020.[1]

In India, the first case of coronavirus was reported in Kerala on January 30th, 2020.[2] In 2021 India's COVID-19 surge was an unprecedented public health crisis. With exponential growth in the number of daily COVID-19 cases since March 2021, more than three cases per second and nearly three deaths per minute at the height of the surge from May 2021.[3] This number was likely to be an underestimate of the true burden of COVID-19 cases, given reports of backlogs of test results, poor access to testing, and many people not getting tested due to fear and stigma.[4,5]

It was observed that about 20% of patients presented with moderate to severe symptoms. Such cases remained vulnerable and needed to be protected. Any delay in care for this segment could lead to progressive deterioration with complications. It was necessary to reduce caseloads of new cases, and quickly treat infected cases to contain the chain of transmission.[6] During the COVID-19 crisis role of AYUSH was appreciated worldwide; Unani medicine in particular played a crucial role.

In 2024, a new epidemic hit the world with respiratory symptoms but a different and less potent virus the human metapneumovirus

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(hMPV) virus. HMPV and COVID-19 (caused by SARS-CoV-2) are both respiratory viruses. Both viruses primarily cause respiratory infections and can range from mild to severe. They share overlapping symptoms such as cough, fever, shortness of breath, fatigue, and nasal congestion. Both spread via respiratory droplets, direct contact, and potentially through contaminated surfaces. Severity is more common in older adults, infants and young children, and individuals with weakened immune systems or underlying health conditions.[7]

Although the havoc created by COVID-19 is over, its incidence persists, with 155,330 cases reported in 28 days until 29 December 2024[8] including 1967 deaths worldwide.[9] Seemingly, this number is lower as very few people are investigated for COVID-19 infection.

Unani Medicine, known for its holistic approach to treatment, emphasizes potentiating and stimulating the "*Tabiyat*" (medicatrix naturi). The Unani classical literature is replete with regimens and remedies that have been used to overcome epidemics that occurred in the past. We short-listed two such formulations, namely *Habbe Zahar Mohra* and *Habbe Tabasheer*[10] to evaluate them for their efficacy and safety in the management of COVID-19. Unani medicine classifies both hMPV and COVID-19 as *Nazla Wabai* and the line of treatment for both is similar. The constituents of these formulations are known to possess antidote, anti-inflammatory, antiviral, and immunomodulatory activities.[11-24]

Methodology

This randomized, parallel-group, single-center clinical trial was conducted from February 2020 to August 2020, with 80 participants (40 in each group). The study was approved by the Institutional Ethical Committee of Jamia Hamdard, New Delhi, and registered with the Clinical Trial Registry of India (Registration No. REFCTRI-2021/03/041870). Written informed consent was obtained from participants who met the inclusion criteria: adults aged 18–60 years, with real-time polymerase chain reaction (RT-PCR)-confirmed mild COVID-19 symptoms, including fever, cough, sore throat, nasal congestion, anosmia, ageusia, or mild pneumonia (without severe symptoms). Exclusion criteria included severe symptoms or comorbid conditions, such as respiratory distress, active hepatitis, tuberculosis, organ failure, or participation in other investigational studies [Figure 1].

Interventions

- Group A (test group): Administered Unani formulations (A1 and A2) alongside standard allopathic treatment for 14 days
  - A1 (*Habbe Zahar Mohra*): 250 mg tablet, twice daily with 200 ml water

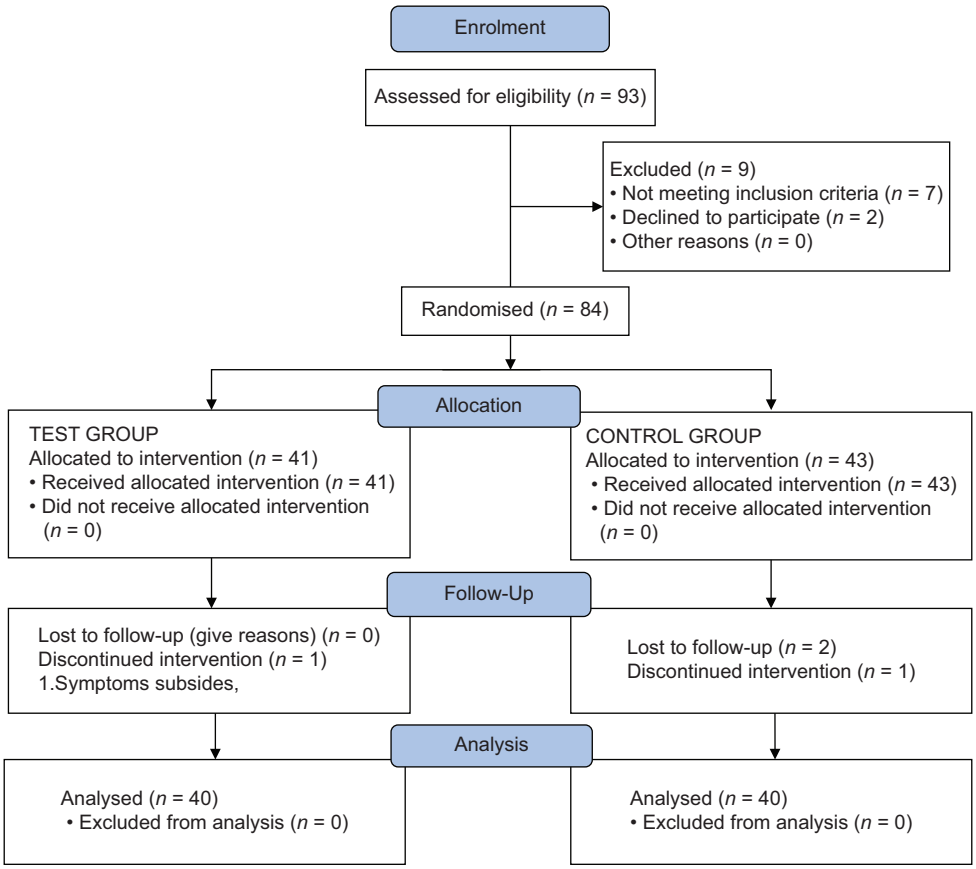

Figure 1: An overview of the clinical study

- A2 (*Habbe Tabasheer*): 250 mg tablet, twice daily with 200 ml water.
- Group B (control group): Received standard allopathic treatment only, as per COVID-19 protocol.

Data collection

Baseline data included demographic details, medical history, and symptom onset. Clinical outcomes were monitored, including fever, cough, anosmia, ageusia, and gastrointestinal symptoms. Laboratory tests, such as complete blood count (CBC), liver function tests (LFT), kidney function tests (KFT), RT-PCR, inflammatory markers (interleukin-6 [IL-6], C-reactive protein [CRP], D-Dimer, serum ferritin, lactate dehydrogenase [LDH]), and immunological markers (immunoglobulin-G [IgG]), were recorded.

Follow-up and outcome measurement

The efficacy and safety of the interventions were assessed using both subjective (symptom resolution) and objective (RT-PCR and laboratory test outcomes) parameters at baseline and posttreatment.

Statistical analysis

Data were analyzed using GraphPad Instat (version 3.10) and Microsoft Excel (GraphPad Software 225 Franklin Street. Fl. 26 Boston) Continuous data were presented as mean ± standard error of mean (SEM), and categorical data as percentages. Intergroup comparisons for continuous variables were made using the unpaired *t*-test, while non-parametric data were analyzed using the Wilcoxon signed-rank test. Significance was set at $P < 0.10$, with $P < 0.01$ and $P < 0.001$ indicating increasing levels of significance and nonparametric Spearman correlation coefficient = *r*.

This methodology ensured a rigorous evaluation of Unani formulations combined with allopathic treatment for managing mild-to-moderate COVID-19 symptoms.

Results and Discussion

A total of 93 patients were assessed for eligibility, of which 7 subjects did not meet the inclusion criteria. The remaining 84 patients were randomized into two groups: Test Group A ($n = 41$) and control Group B ($n = 43$). During the study, two patients from the control group were lost to follow-up, and one patient from each group discontinued the intervention. Ultimately, 40 patients from each group completed the protocol therapy and were evaluated as per the approved study protocol.

The mean age ± SEM of patients in the test group was 40.55 ± 2.096 years, while in the control group, it was 39.75 ± 1.944 years. The test group comprised 25 males and 15 females, whereas the control group included 17 males and 23 females [Table 1].

Table 1: Age and gender

	Mean±SEM	Median	Male	Female	Lower 95% CI	Higher 95% CI
Test group	40.55±2.096	45	25	15	36.309	44.791
Control group	39.75±1.944	38	17	23	35.816	43.684
P	0.7804 (NS)					

CI: Confidence interval, SEM: Standard error of mean, NS: Nonsignificant

The study demonstrated excellent outcomes on subjective parameters, with both groups successfully resolving all symptoms. However, in Group A the symptoms resolved more effectively than in Group B [Table 2]. On objective parameters, the drugs also performed well.

CRP is a member of the pentraxin family of proteins. Being secreted by the liver in response to a variety of inflammatory cytokines, the levels of CRP increase very rapidly in response to trauma, inflammation, and infection and decrease just as rapidly with the resolution of the condition.[25] In our study, the mean of CRP in the test group was 14.133 ± 4.361 before treatment which decreased significantly to 6.779 ± 1.331 in the test group while the mean CRP was 17.5504 ± 4.281 before treatment and came down drastically to 4.0236 ± 0.9165 showing extremely significant change bio-statistically. Researchers have recommended that CRP ≥40 mg/L on admission may indicate an increased risk of disease progression and death. Furthermore, the association of higher CRP with worse outcomes may be due to the severity of the disease consistent with the "cytokine storm" theory of COVID-19, where the innate immune system is activated releasing tumor necrosis factor-alpha, IL-6, and IL-1.[26] The level of CRP in our study indicates that the subjects included in our study were within the ambit of inclusion and exclusion criteria outlined in our approved protocol and these levels of CRP prove that biochemically as well.[26] [Table 3].

Ferritin is a key mediator of immune dysregulation, especially under extreme hyperferritinemia, via direct immune-suppressive and pro-inflammatory effects, contributing to the cytokine storm. It has been reported that fatal outcomes by COVID-19 are accompanied by cytokine storm syndrome, thereby it has been suggested that disease severity is dependent on the cytokine storm syndrome.[27]

In our study, the serum ferritin level in the test group at the time of enrolment was 344.6435 ± 91.937 which decreased to 140.6175 ± 19.698 after treatment, whereas in the control group, it was 489.28735 ± 105.33 at the time of enrolment and it reduced to 147.32075 ± 21.595 after treatment, $P < 0.0001$*** for both the groups [Table 4]. These results are quite consistent with the observations of other researchers. A study reported that both ferritin and IL-6 concentrations showed higher values in nonsurvivors in comparison to discharged patients throughout the clinical

Table 2: Subjective parameters

Subjective parameters	Group A				Group B			
	BT		AT		BT		AT	
	Number of cases	Percentage of patients relieved	Cases relieved	Percentage of patients relieved	Number of cases	Percentage of patients relieved	Cases relieved	Percentage of patients relieved
Fever	40	100.0	40	100.0	40	100.0	37	92.5
Dry cough	40	100.0	32	80.0	40	100.0	28	70.0
Running nose	30	75.0	30	75.0	32	80.0	30	75.0
Sore throat	32	80.0	28	70.0	35	87.5	33	82.5
Breathlessness	32	80.0	30	75.0	30	75.0	27	67.5
Feeling of wellness	0	0	35	87.5	0	0	30	75.5
Loss of smell	4	10.0	4	10.0	7	17.5	3	7.5
Loss of taste	9	22.5	9	22.5	10	25.0	7	17.5
Skin manifestation	0	0	0	0	0	0	0	0
Vomiting	17	42.5	17	42.5	15	37.5	13	32.5
Loose motion	12	30.0	10	25.0	13	32.5	9	22.5
Pain in abdomen	15	37.5	13	32.5	13	32.5	5	12.5

BT: Before treatment, AT: After treatment

Table 3: C-reactive protein (mg/dL)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	14.133±4.361	6.779±1.331	17.5504±4.281	4.0236±0.9165
Lower 95% CI	5.310	4.087	8.898	2.171
Higher 95% CI	22.957	9.472	26.202	5.876
P	0.0101*		<0.0001***	
r	0.5653		0.5543	

* significant, *** extremely significant. BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval

Table 4: Serum ferritin (ng/mL)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	344.6435±91.937	140.6175±19.698	489.28735±105.33	147.32075±21.595
Lower 95% CI	91.937	19.698	276.20	103.63
Higher 95% CI	530.64	180.47	702.37	171.01
P	<0.0001***		<0.0001***	
r	0.8194		0.8858	

*** extremely significant. BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval

course, and increased as the patient deteriorated.[28] It has also been reported that when patients begin to recover, the ferritin and IL-6 concentrations decrease. In our study, CRP, ferritin, IL-6, and LDH decreased significantly after recovery.[29]

Elevated levels of LDH are an indicator of some kind of tissue injury. LDH levels typically rise as the cellular destruction, subsequently it begins to peak after some time period, and then begins to fall.[30] In this study, the mean LDH levels at the enrolment in the test group was 382.495 ± 36.396 which went down to 318.24 ± 10.391 after treatment, whereas in the control group, the baseline value of LDH was 445.155 ± 49.802 at enrolment which decreased to 317.8575 ± 12.428 after treatment. *P* value for both groups was not significant statistically [Table 5]. Elevated LDH levels have been observed in the blood of patients with COVID-19, and levels of this enzyme correlate with disease severity. Moreover, these levels subside along with the recovery from COVID-19.[31]

In this study, the mean serum IgG levels at the baseline were 38.9395 ± 18.951 which had decreased to 30.2365 ± 11.867 at the end of protocol therapy, whereas in the control group, the baseline value was 31.68275 ± 9.997 which further increased to 49.536 ± 15.773 after treatment. *P* value was statistically not significant for both groups [Table 6]. In a study conducted on 285 patients with COVID-19 within 19 days after symptom onset, 100% of patients tested positive for antiviral IgG. Furthermore, the seroconversion for IgG and immunoglobulin-M (IgM) occurred simultaneously or sequentially. Further, both IgG and IgM titer plateaued within 6 days after seroconversion.[32] As we tested the IgG levels at baseline and only once thereafter at 2-week

Table 5: Lactate dehydrogenase (U/L)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	382.495±36.396	318.24±10.391	445.155±49.802	317.8575±12.428
Lower 95% CI	308.86	297.22	344.39	292.72
Higher 95% CI	456.13	339.26	545.91	342.99
P	0.3031 (NS)		0.079 (NS)	
r	0.3989		0.7532	

BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval, NS: Nonsignificant

Table 6: Immunoglobulin-G (index)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	38.9395±18.951	30.2365±11.867	31.68275±9.997	49.536±15.773
Lower 95% CI	0.6003	6.228	17.458	17.626
Higher 95% CI	77.279	54.245	51.907	81.446
P	0.1276 (NS)		0.1139 (NS)	
r	0.7677		0.6443	

BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval, NS: Nonsignificant

intervals not much could be made out from these results. However, in a study to check the acute antibody response to SARS-CoV-2 infection, virus-specific IgG and IgM were measured in serum samples from asymptomatic and symptomatic individuals. In the asymptomatic group, 81.1% (30/37) tested positive for IgG, and 83.8% (31/37) of the symptomatic group tested positive for IgG approximately 3–4 weeks after exposure. Interestingly, IgG levels in the symptomatic group (median S/CO, 20.5; interquartile range [IQR], 5.8–38.2) were significantly higher than those in the asymptomatic group (median S/CO, 3.4; IQR, 1.6–10.7) in the acute phase (the period when the viral RNA can be found in a respiratory specimen) (P = 0.005).[33] Perhaps in our results, the decrease in IgG level in the test group may be due to the immune-modulatory effect of the test drugs.[11-24]

In this study, the mean serum IL6 levels at the baseline were 157.1205 ± 61.011 which decreased to 105.2295 ± 36.748 at the end of protocol therapy, whereas in the control group, the baseline value was 26.57325 ± 4.584 which further increased to 282.6675 ± 69.704 after treatment. *P* value was statistically not significant for both groups [Table 7]. In an earlier study, it was observed that asymptomatic individuals exhibited lower levels of 18 pro- and anti-inflammatory cytokines. These data suggest that asymptomatic individuals had a weaker immune response to SARS-CoV-2 infection. Furthermore, the data from this study collectively shows that the asymptomatic individuals had a reduced inflammatory response characterized by low circulating concentrations of cytokines and chemokines.[33] From these observations, it seems perhaps the test drug had some immunomodulatory effect leading to a decrease in IL6 and may have been able to prevent cytokine storm as the constituents of the test drug are known to possess anti-inflammatory properties.[33]

In this study, the mean D.Dimer levels at the enrolment in the test group were 67.185975 ± 55.240 which went down to 5.9815 ± 5.237after treatment, whereas in the control group, the baseline value of D.Dimer was 77.579975 ± 55.403 at enrolment which decreased to 6.8648 ± 5.246 after treatment. *P* value for the test group was statistically significant (P = 0.0117*) while the control group (P = 0.4687ns) was nonsignificant statistically [Table 8]. The elevated levels of D.Dimer have been used as a biomarker for the prediction of prognosis in COVID-19. Its rise has also been related to the rise in markers of inflammation. Moreover, with recovery, the D. Dimer levels also come down along with the markers of inflammation.[34,35] From the significant decrease of D. Dimer levels in the test group, it seemingly is evident that the test drug has acted through the host immune response and probably modulated the inflammatory cascade effect as the constituents of the test drug are already proven to possess anti-inflammatory, immunomodulatory effect, and also, these formulations are listed as antiepidemic in the classical Unani literature.[11-24]

No adverse effect was reported during the study period, and CBC, LFT, and KFT were within normal range. From the study, it appears the test drugs *Habbe Tabasheer* and *Habbe Zahar Mohra* appear to be potent anti-inflammatory and hence can be beneficial in other anti-inflammatory conditions like hMPV.

Conclusion

This study demonstrated that the test drugs *Habbe Tabasheer* and *Habbe Zahar Mohra* exhibited significant therapeutic benefits in comparison to the control group, particularly in terms of inflammatory markers such as CRP, serum ferritin, IL-6, and D-dimer. These findings suggest that the test drug effectively modulated the

Table 7: Interleukin-6 (pg/mL)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	157.1205±61.011	105.2295±36.748	26.57325±4.584	282.6675±69.704
Lower 95% CI	33.690	30.885	17.299	141.65
Higher 95% CI	280.55	179.57	35.848	423.69
P	0.9519 (NS)		0.0815 (NS)	
r	0.2901		0.03948	

BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval, NS: Nonsignificant

Table 8: D-Dimer (µg/mL)

	Test group		Control group	
	BT	AT	BT	AT
Mean±SEM	67.185975±55.240	5.9815±5.237	77.579975±55.403	6.8648±5.246
Lower 95% CI	−44.57	−4.614	−34.505	−3.749
Higher 95% CI	178.94	16.574	189.66	17.477
P	0.0117*		0.4687 (NS)	
r	0.3541		0.2273	

BT: Before treatment, AT: After treatment, SEM: Standard error of mean, CI: Confidence interval, NS: Nonsignificant, *: Significant

inflammatory and immune response, potentially preventing the progression of cytokine storms and facilitating recovery in COVID-19 patients.

The substantial reduction in CRP and ferritin levels in both groups highlights the overall effectiveness of the treatments; however, the more pronounced improvement in the test group underscores the added benefits of the test drug. Furthermore, while LDH and IgG levels showed limited statistical significance, their trends provide insights into the immune and recovery dynamics influenced by the interventions.

This study highlights the potential of the test drugs as an anti-inflammatory and immune-modulatory agent, consistent with its traditional uses as described in classical Unani literature. Hence, they can be used in other epidemic conditions like hMPV. However, further studies with larger sample sizes and extended follow-up periods are warranted to confirm these findings and explore the broader implications of the test drug in managing COVID-19 and other inflammatory conditions.

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Conflicts of interest

There are no conflicts of interest.

References

1. Agarwal KM, Mohapatra S, Sharma P, Sharma S, Bhatia D, Mishra A. Study and overview of the novel corona virus disease (COVID-19). Sens Int 2020;1:100037.
2. Goyal K, Chauhan P, Chhikara K, Gupta P, Singh MP. Fear of COVID 2019: First suicidal case in India! Asian J Psychiatr 2020;49:101989.
3. Edouard Mathieu HRLRGCADGCGJHBMSDDBEOO and MR. India: Coronavirus Pandemic Country Profile. Our World In Data; 2021. Available from: https://ourworldindata.org/coronavirus/country/india. [Last accessed on 2023 Dec 11].
4. Jamkhandikar S GD. Many Indians struggle to Get Coronavirus Tests as Cases Rocket; 2021. Available from: https://www.reuters.com/world/india/many-indians-struggle-get-coronavirus-tests-cases-rocket-2021-04-20/. [Last accessed on 2023 Dec 11].
5. Fear, Stigma, Laxity Contribute to Rising COVID-19 Cases. Indian Express; 2021.
6. Frischer M, Goldberg D, Bloor M, Green S, McKeganey N. An apology from Frischer *et al*. Addiction 1994;89:353.
7. Human Metapneumovirus (hMPV) Infection. Available from: https://www.who.int/news-room/questions-and-answers/item/human-metapneumovirus-(hmpv)-infection. [Last accessed on 2025 Jan 17].
8. COVID-19 Cases | WHO COVID-19 Dashboard. Available from: https://data.who.int/dashboards/covid19/cases?n=o. [Last accessed on 2025 Jan 17].
9. COVID-19 Deaths | WHO COVID-19 Dashboard. Available from: https://data.who.int/dashboards/covid19/deaths?n=o [Last accessed on 2025 Jan 17].
10. Anonymous. National Formulary of Unani Medicine (NFUM) Part-I. Reprint. Vol. 1. New Delhi: Central Council for Research in Unani Medicine, Department of AYUSH, Ministry of Health & Family Welfare, Govt of India; 2006. p. 35-6.
11. Mustehasan AMNSAM. Zahar Mohra (Bezoar) an Alexipharmic Unani Mineral Drug: Review. J Drug Delivery Ther 2020;10:236-8. Available from: https://jddtonline.info/index.php/jddt/article/view/4395. [Last accessed on 2025 Jan 17].
12. Ali M, Hamiduddin, Zaigham M, Ikram M, Shadab M, Rather G. Preliminary physicochemical evaluation of Kushta-e-Aahar Mohra: A unique formulation of Unani medicine. Anc Sci Life 2018;37:127.

13. Kumar A, Kumar S, Singh MK, Tiwari SK. A comprehensive review on the chemical composition and pharmacological activities of ACACIA ARABICA. Intell Pharm 2024;2:729-36.
14. Author C, Bansod BB, Goukonde R, Sanap G. Review on acacia Arabica and it's medicinal uses. Int J Pharm Sci 2024;1:1-1. Available from: https://www.ijpsjournal.com/article/A-Review-On-Acacia-Arabica-And-It's-Medicinal-Uses. [Last accessed on 2025 Jan 17].
15. Kayum MA, Qaiyyum IA, Jabeen A, Nawab M. Review on pharmacological and therapeutic profile of zaranbad (*Curcuma Zedoaria* Rosc.). World J Pharm Sci 2020;9:60-6. Available from: https://wjpsonline.com/index.php/wjps/article/view/80. [Last accessed on 2025 Jan 17].
16. Gharge S, Hiremath SI, Kagawad P, Jivaje K, Palled MS, Suryawanshi SS. *Curcuma zedoaria* Rosc (*Zingiberaceae*): A review on its chemical, pharmacological and biological activities. Futur J Pharm Sci 2021;7:166.
17. Chauhan D, Tyagi M, Sharma S, Sharma R. A comprehensive review of Kachur (*Curcuma Zedoaria* Rosc.): A potent herbal drug for various ailments. Int J Ayurveda Pharm Res 2023;11:60-9.
18. Aisha Anjum A, Tabassum K, Ambar S. Tabasheer (*Bambusa arundinaceae* Retz.) A plant origin drug of Unani medicine – A review. J Ayurvedic Herb Med 2019;5:31-4.
19. Asadi-Samani M, Bahmani M, Rafieian-Kopaei M. The chemical composition, botanical characteristic and biological activities of *Borago officinalis*: A review. Asian Pac J Trop Med 2014;7S1:S22-8.
20. Gilani AH, Bashir S, Khan AU. Pharmacological basis for the use of *Borago officinalis* in gastrointestinal, respiratory and cardiovascular disorders. J Ethnopharmacol 2007;114:393-9.
21. Gupta A, Gupta P, Bajpai G. *Tinospora cordifolia* (Giloy): An insight on the multifarious pharmacological paradigms of a most promising medicinal Ayurvedic herb. Heliyon 2024;10:e26125.
22. Arunachalam K, Yang X, San TT. *Tinospora cordifolia* (Willd.) Miers: Protection mechanisms and strategies against oxidative stress-related diseases. J Ethnopharmacol 2022;283:114540.
23. Sarma YR, Nirmal Babu K, Aziz S, Spices and Aromatics, Editor(s): Neal K. Van Alfen, Encyclopedia of Agriculture and Food Systems, Academic Press, 2014;1:211-34.
24. Ashokkumar K, Murugan M, Dhanya MK, Warkentin TD. Botany, traditional uses, phytochemistry and biological activities of cardamom [*Elettaria cardamomum* (L.) Maton] – A critical review. J Ethnopharmacol 2020;246:112244.
25. Du Clos TW. Function of C-reactive protein. Ann Med 2000;32:274-8.
26. Stringer D, Braude P, Myint PK, Evans L, Collins JT, Verduri A, *et al*. The role of C-reactive protein as a prognostic marker in COVID-19. Int J Epidemiol 2021;50:420. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7989395/. [Last cited on 2025 Jan 19].
27. Fox SE, Akmatbekov A, Harbert JL, Li G, Brown JQ, Saeidi M. Ferritin levels and COVID-19. Rev Panam Salud Publica 2020;44:1375-84. Available from: https://iris.paho.org/handle/10665.2/52235. [Last accessed on 2025 Jan 19].
28. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, *et al*. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet 2020;395:1054-62.
29. Liu T, Zhang J, Yang Y, Ma H, Li Z, Zhang J, *et al*. The role of interleukin-6 in monitoring severe case of coronavirus disease 2019. EMBO Mol Med 2020;12:e12421.
30. Farhana A, Lappin SL. Biochemistry, Lactate Dehydrogenase. In: StatPearls. Treasure Island (FL); 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557536/. [Last accessed on 2024 Jan 19].
31. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020 ;395:497-506.
32. Long QX, Liu BZ, Deng HJ, Wu GC, Deng K, Chen YK, *et al*. Antibody responses to SARS-CoV-2 in patients with COVID-19. Nat Med 2020;26:845-8.
33. Long QX, Tang XJ, Shi QL, Li Q, Deng HJ, Yuan J, *et al*. Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. Nat Med 2020;26:1200-4.
34. Yu B, Li X, Chen J, Ouyang M, Zhang H, Zhao X, *et al*. Evaluation of variation in D-dimer levels among COVID-19 and bacterial pneumonia: A retrospective analysis. J Thromb Thrombolysis 2020;50:548-57.
35. Poudel A, Poudel Y, Adhikari A, Aryal BB, Dangol D, Bajracharya T, *et al*. D-dimer as a biomarker for assessment of COVID-19 prognosis: D-dimer levels on admission and its role in predicting disease outcome in hospitalized patients with COVID-19. PLoS One 2021;16:e0256744.

Original Article

Ethnobotanical Survey of Medicinal Plants Used by the Naikpod Tribes of Jayashankar Bhupalpally Area of Telangana State

Abstract

Background: Traditional knowledge of medicinal plants plays a significant role in the healthcare systems of indigenous communities. In India, tribal populations rely extensively on ethnomedicine for primary healthcare needs. The Naikpod and other tribal communities of Jayashankar Bhupalpally in Telangana state are known to possess rich ethnobotanical knowledge, much of which remains undocumented. **Aims and Objectives:** The present study aims to document and analyzet he first-hand information on the use of medicinal plants in Jayashankar Bhupalpally area located in the Bhupalpally district of newly formed Telangana State. **Methodology:** The information was gathered from the Naikpod and other tribes using an integrated approach of botanical collections, group discussions, and questionnaire-based interviews with 20 tribal practitioners (informants). **Results:** A total of 46 contemporary folk medicinal claims on 32 ethnomedicinally important plant species, distributed in 26 families, were documented in the present study. The documented ethnomedicinal plants were mostly used for the treatment and cure of 32 different disease conditions including abdominal ulcers, worm infestation, poisonous bites, low libido, burning micturition, crack in bones (fracture), cut and wounds, alopecia, general weakness, indigestion, paralysis and rheumatic pains. **Conclusion:** The results of the present study provide evidence that the tribal people of the study area still have a strong belief in the efficacy and success of ethnomedicines. The medicinal plants continue to play an important role in the healthcare system of the Naikpod tribal community in the Jayashankar Bhupalpally area of Telangana.

Keywords: *Bhupalpally, ethnobotanical survey, ethnomedicines, Naikpod, traditional knowledge*

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Introduction

India is one of the 12 mega-biodiversity countries of the world, having rich vegetation with a wide variety of plants with medicinal values. India is also an inhabitant of the oldest, richest, and most diverse cultured traditions associated with the use of medicinal plants in the form of traditional systems of medicine.[1] The plant-based systems of medicine continue to provide the needs of primary health care since thousands of years. The tribal communities that live close to nature have acquired the indigenous knowledge to use the medicinal plants against different disease conditions.[2,3]

Even today, many local and indigenous communities in the Asian countries meet their basic needs from the products they manufacture and sell based on their traditional knowledge. The major populations of the tribal and rural people, who are residing in completely remote areas, are more or less dependent on the forest products, especially on the medicinal plants. The ethnomedicines obtained from the plants are believed to be much safer and have proved its efficacy in the management of various ailments.[4]

In India, nearly 427 different tribal communities are present, and they largely depend on ethnomedicine.[5] The interest in traditional knowledge on ethnomedicine has continuously been increasing; recently, various ethnobotanical studies have been explored, and the documentation of knowledge from the various tribes of Andhra Pradesh and Telangana has been reported in detail by many workers.[1,6,7]

The documented report clearly reveals that many tribal areas and tribal communities in the Bhupalpally, Karimnagar region of India, are either underexplored or unexplored with respect to their ethnomedicinal traditional wealth used in curing different diseases. The Naikpod is one such little-studied tribe of the newly

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formed Telangana state (TS). Therefore, a need was felt to gather in-depth information on the plant species used by this tribal group and suggest that similar studies need to be carried out across the various groups of tribes for comparison as well as for documenting the knowledge that may be under threat due to the influence of urbanization. Based on this rationale, the present study aims to highlight and record in detail the traditional knowledge of the Naikpod tribe on the use of medicinal plant species growing in and around their settlements in tribal pockets of the Bhupalpally area.

The study area

Bhupalpally (Acharya Jayashankar) district is carved out of erstwhile Warangal district with the annexation of some parts of Karimnagar and Khammam [Figure 1]. The district is named after the Telangana ideologue Prof. K. Jayashankar. The district is spread over an area of 6175 square kilometers (2.384 km^2). It is surrounded by Peddapalli, Mahabubabad, Warangal Rural, Warangal Urban, and Kothagudem districts and the states of Chhattisgarh and Maharashtra. The district has a population of 750000 as per the 2011 census of India. The district comprises 20 mandals and 2 revenue divisions – Bhupalpally and Mulugu. The district headquarters is located at Bhupalpally town. The climate of district range is generally dry with temperatures ranging from 20°C to 44°C, and the annual rainfall is about 756 mm, received mainly from Southwest monsoons. The soil types found mainly are black cotton, sandy loam, alluvial, and lateritic with less humus in the top layer.[8]

The largest tribal group in this district is Naikpod [Figures 2 and 3]. The Naikpods live in forest areas of

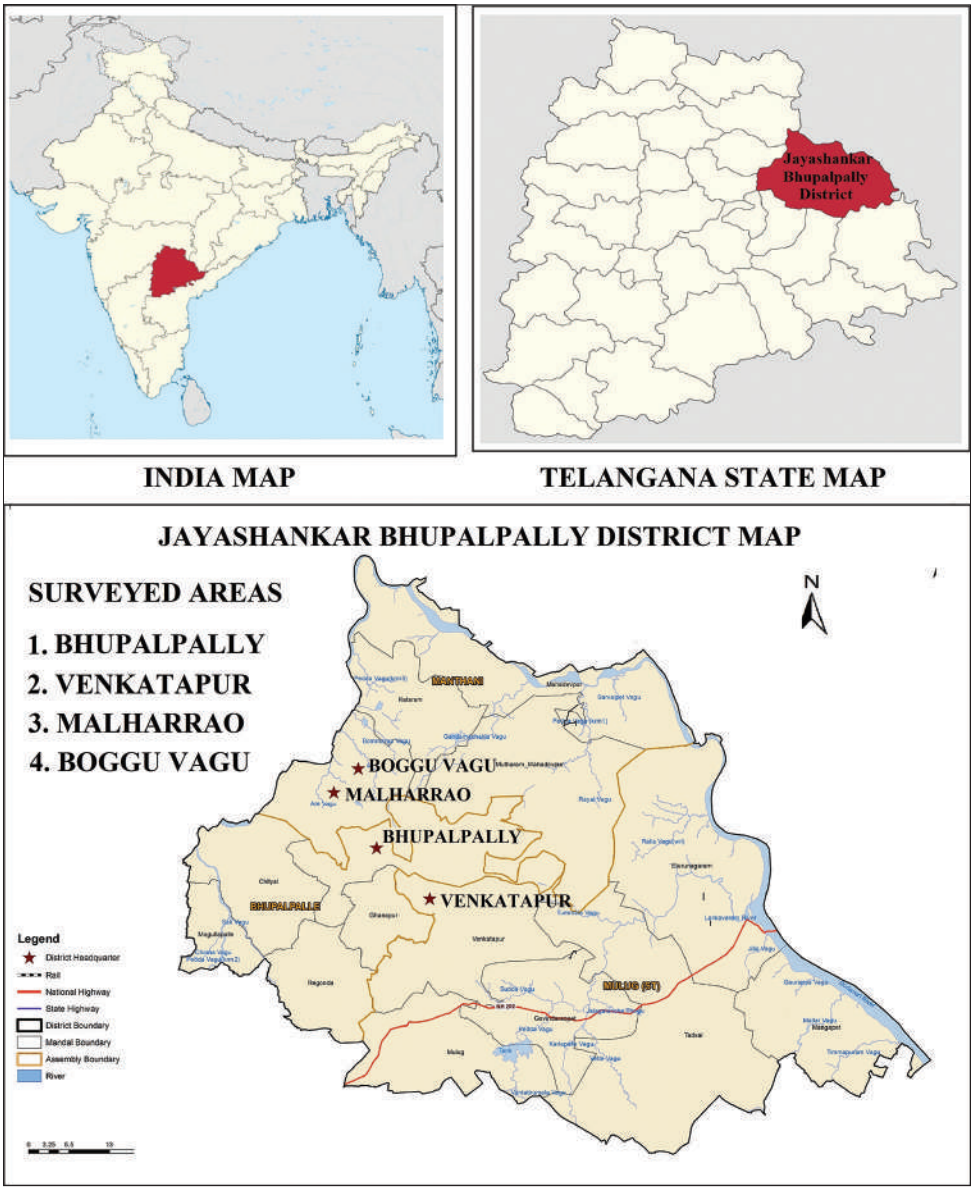

Figure 1: Map of the studied area

Figure 2: (a) Collection of folklore claims from a Naikpod tribe in the forest of Venkatapur, (b) Collection of crude drugs from a Naikpod tribe in the forest area of Boggu Vagu

Figure 3: (a) Survey team at Naikpod tribal Hamlet in Bhupalpally, (b) Discussion and documentation of information with a Naikpod tribe at Malharrao

northern Telangana, like Nayaks. The generic word Nayak means "leader," but the suffix pod means "that person." The Naikpods are listed along with Gonds and Raj Gonds in the list of Scheduled Tribes by the Scheduled Castes and Scheduled Tribes Orders (Amendment) Act, 1976. Laxmi Devata, consort of Lord Krishna, is the chief deity to Naikpods. Naikpods generally put on the colorful masks of Laxmi Devara, Lord Krishna, Lord Krishna, Lord Siva, five brother Pandavas, Pandi Raju (Pig God), Pota Raju (Dog God), Gorrapothu (Sheep God), and Singaboyudu and perform rituals. They adopted the Podu cultivation method in hilly areas. The word Podu comes from the Telugu language,[9] and it is a traditional system of cultivation used by tribes in India, whereby different areas of jungle forest are cleared by burning each year to provide land for crops.[10] It is a shifting cultivation method, where a plot of land is cultivated for a few years until the crop yield declines due to soil exhaustion and the effects of pests and weeds. By doing this type of cultivation, they were named Naikpod. The Naikpod community is largely found inside scheduled areas and sparsely outside them; they are divided into a number of exogamous groups on the basis of surnames or sects. The surname only regulates the matrimonial relations. Most of these tribal people's hamlets are located on higher elevations, which are very remote. Due to their remote inhabitation, they commonly met with chronic and acute diseases, and their source of medicine is plant-based drugs.

Methodology

The extensive field work was conducted during 2014-2015 in the villages of Venkatapur, Bhupalpally, Malharrao, and Boggu Vagu, which come under Bhupalpally district [Figure 1]. The information was collected after obtaining informed consent from the 20 informants (mostly traditional healers) in the age groups of 40–70 years using open and closed semi-structured interviews based on questionnaires and discussion in the local Telugu language, generally in an exact order. The questionnaire allowed responses on the plant, medicinal uses of its parts, method of preparation (i.e., decoction, paste, powder, and juice), dosage, mode of administration, form of usage (either fresh or dried), and whether the plants were used either singly or in combination with other plants.

All the plants were taxonomically identified by the senior author with the help of related flora: "The Flora of Presidency of Madras" by Gamble.[11] Voucher herbarium specimens were prepared and preserved in the Herbarium of Survey of Medicinal Plant Unit of National Research Institute of Unani Medicine for Skin Disorders, Hyderabad, for future reference and study. The process of collection of voucher specimens, preservation, herbaria, and technique for the collection of ethnomedicinal information was followed as per the method of Jain and Rao.[12]

Table 1: List of folk medicinal claims documented from Jayashankar Bhupalpally area of Telangana State

Botanical name/ family/habit	UN/LN	Area of collection/ claimed by	Field book number	Part used	Ethnomedicinal uses
I. cairica (L.) Sweet/ Convolvulaceae/ Climber	Pandiri teega (LN)	Venkatapur/ Krishnaiah (Naikpod)	SMPU/ CRI-Hyd12030	Seed	Intermittent fever; one teaspoon (5 g) of pounded seed powder
X. xylocarpa (Roxb.) Taub./Mimosaceae/ Tree	Thangedumanu (LN)	Venkatapur/ Krishnaiah (Naikpod)	SMPU/ CRI-Hyd12031	Seed and bark	Anthelmintic; boiled seeds are edible and useful in hookworm' infection
					Gonorrhea; 8–10 g of bark powder daily for 2 months
H. pubescens (Buch.-Ham.) Wall. ex G. Don/ Apocynaceae/Small tree	Inderjo-talkh (UN)/Kodisa pala (LN)	Venkatapur/*Eswar/ Naikpod*	SMPU/ CRI-Hyd12036	Leaves and root bark	Hematochezia (blood in stool); oral administration of 10 mL of leaf juice once for 3 days
					Stomachache during pregnancy; oral administration of 3–5 g paste made by grounding the root bark and black pepper (3 numbers)
E. alsinoides (L.) L./Convolvulaceae/ Herb	Suryakantham (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12037	Whole plant	High fever; whole plant is grounded into paste, oral administration of 5 g paste twice a day, morning and evening
B. ceiba L./ Bombacaceae/Tree	Sainbhal (UN)/ Mundlaburaga (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12039	Root bark	Rheumatic pains; oral administration of 6 g powder of pounded root bark once for 1 month
S. auriculata (L.) Roxb./ Caesalpiniaceae/ Shrub	Tarwar (UN)/ Tangedu (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12041	Root bark and flower	Diabetes; oral administrations of 5 g powder of pounded root bark daily
					Indigestion; Consuming flowers (3–5) gives immediate relief
M. tinctoria Roxb./ Rubiaceae/Tree	Toguru (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12042	Fruit and bark	UTI; the fruits and bark of the plant along with the stem of *T. cordifolia* are pounded and mixed in equal quantities. About 5–8 g of the prepared mixture is given once for a month
Madhuca longifolia var. *latifolia* (Roxb.) Chevalier/ Sapotaceae/Tree	Mahua (UN)/ Ippa (LN)	Venkatapur Eswar/ Naikpod	SMPU/ CRI-Hyd12043	Bark	Bone fracture; bark is shade dried and pounded. About 20 g of powder is mixed with egg albumin and made into a paste to apply externally on affected areas followed by covering with a cotton bandage for 1 month duration
					Oral administration of 5–8 g of bark powder daily once for 1 month duration heal the cracked bones
S. virginianum L./ Solanaceae/Herb	Katai-Khurd (UN)/ Nelamulaka (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12044	Fruit	Sinusitis; the fruits are grounded into a paste and mixed with latex of *C. gigantea*. The preparation is kept for a day and then used as nasal drops. 2–3 drops of this preparation is used in the morning for 1 month duration
T. grandis L.f./ Verbenaceae/Tree	Saagwan (UN)/ Taeku (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12045	Young branch and stem	Toothache; young branches are used as tooth brush to get relief from pain
					Cuts and wounds; powder made from the coal obtained from the fired stems is used externally for healing
C. swietenia DC./ Rutaceae/Tree	Billudu (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12046	Bark	Cuts and wounds; bark is burnt and the ash is applied externally to heal the cuts and wounds
					Skin allergy; external application of the powdered bark is used to cure skin allergy
C. viscosa L./ Cleomaceae/Herb	Hurhura/ Bantakalan (UN)/ Kukkavaaminta (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12048	Root	Low sperm count; roots are pounded and mixed with seed powder of *M. pruriens* and root powder of *C. orchioides* in equal quantities. Oral administration of this preparation for a month increases sperm count
B. serrata Roxb. ex Coleb./Burseraceae/ Tree	Kundur (UN)/ Anduga (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12049	Gum and bark	Stomach ulcers; oral administration of 2 g of gum once a day for 3 months
					Paralysis; oral administration of 5 g powdered bark two times a day up to 6 months claimed to show good results especially in the movements of affected body parts

Contd...

Table 1: Contd...

Botanical name/ family/habit	UN/LN	Area of collection/ claimed by	Field book number	Part used	Ethnomedicinal uses
E. monogynum Roxb./ Erythroxylaceae/ Small tree	Devadaru (LN)	Bhupalpally/ Rathnaiah/Naikpod	SMPU/ CRI-Hyd12050	Bark	Energy booster; oral administration of 5 g bark powder daily gives immense energy
					Paralysis; oral administration of 10 g bark is powder daily two times up to 6 months cures the movement of paralyzed body parts
A. precatorius L./ Fabaceae/Climber	Gunchi (UN)/ Guriginja (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12051	Seed	Hair growth; external application of paste made from the seed powder and water on the affected area, stimulates the hair growth within 2 weeks
E. antiquorum L./ Euphorbiaceae/Tree	Bomma jemudu (LN)	Bhupalpally/ Rathnaiah/Naikpod	SMPU/ CRI-Hyd12060	Stem latex	Mouth ulcers; external applications of latex produced from the stem used to treat mouth ulcers
C. viminale (L.) L./ Asclepiadaceae/ Climber	Eduu pullangi teege (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12061	Stem	Mouth ulcers; part of stem is used to cure mouth ulcers
A. salviifolium (L.f.) Wangerin/ Alangiaceae/Small tree	Ankol/Akola (UN)/Ooduga (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12067	Seed and bark	Paralysis; massaging with oil extracted from the seeds by the process of putam is used externally on the affected area for 6 months duration, improve the paralyzed parts
					Antidote (dog bite); oral administration of 8g bark powder for three continuous days works as antidote, claimed to cure mad dog bite
W. volubilis (L.f.) Stapf/ Asclepiadaceae/ Climber	Nakchikni (UN)/ Bandiguri-Ginja (LN)	Bhupalpally/ Rathnaiah/Naikpod	SMPU/ CRI-Hyd12068	Leaf and root	Antidote (scorpion sting); oral administration of the paste made by pounding 2–3 leaves alongwith 3 g of black pepper powder works as antidote to treat scorpion sting
					Syphilis; oral administration of about 5 g paste made by pounding roots alongwith a cup of goat milk daily in the morning for 2 months relieves
E. prostrata (L.) L./ Asteraceae/Herb	Bhangra (UN)/ Guntagalijeru	Bhupalpally/ Rathnaiah/Naikpod	SMPU/ CRI-Hyd12069	Whole plant	Aphrodisiac and low sperm count; the shade dried and pounded powder of the whole plant of *E. prostrata*, leaf powder of *C. zeylanica* and seed powder of *M. pruriens* are mixed in equal quantities. Oral administration of one teaspoon (5 g) mixed powder daily claimed to increases sperm count and work as aphrodisiac
T. arjuna (Roxb. ex DC.) Wight and Arn./Combretaceae/ Tree	Arjun (UN)/Tella maddi (LN)	Bhupalpally/ Gudepu Rajaiah/ Naikpod	SMPU/ CRI-Hyd12071	Bark	Dog bite; oral administration of 5–8 g of mixture made from the bark of the *T. arjuna* and *P. pinnata* in equal quantity, daily for four days claimed to work as antidote to cure mad dog bite (rabies treatment)
					Rheumatic pains; oral administration of the bark powder (5–8 g)
A. mexicana L./ Papaveraceae/Herb	Satyanasi (UN)/ Bramhadandi (LN)	Bhupalpally/ Gudepu Rajaiah/ Naikpod	SMPU/ CRI-Hyd12072	Root	Pyelonephritis (Kidney infection); oral administration of about 7–10 g of root paste daily for 1 month duration cure pus formation in kidney due to severe UTI
T. portulacastrum L./ Aizoaceae/Herb	Tella atikamamidi (LN)	Venkatapur/Eswar/ Naikpod	SMPU/ CRI-Hyd12073	Whole plant and leaves	Fever; take whole plant of *Trianthema* and leaves of *A. paniculata* in equal quantities and pound into a paste. Oral administration of t 5 g of this paste daily two times, morning and evening for a week give relief from severe fever
					Watering of eyes; 3 drops of leaf juice are used as eye drops
					UTI; oral administration of 5 g root paste daily for 1 month useful in UTI
L. parviflora Roxb./ Lythraceae/Tree	Chinangi (LN)	Malharrao/ Naikpod/Jangapa Narayana	SMPU/ CRI-Hyd12074	Bark	Carbuncle; external application of bark powder on affected area used for healing

Contd...

Table 1: Contd...

Botanical name/ family/habit	UN/LN	Area of collection/ claimed by	Field book number	Part used	Ethnomedicinal uses
H. suaveolens (L.) Poit./Lamiaceae/ Herb	Seema thulasi (LN)	Malharrao/ Naikpod/Jangapa Narayana	SMPU/ CRI-Hyd12077	Leaves	Antidote (scorpion sting); external application of the leaf paste on the sting site
A. indica L./ Aristolochiaceae/ Climber	Zarawand (UN)/ Nalla Eswari (LN)	Malharrao/ Naikpod/Jangapa Narayana	SMPU/ CRI-Hyd12080	Leaves	Diabetes; 2–3 leaves daily
O. basilicum L./ Lamiaceae/Herb	Badrooj/ Sosambar (U.N)/ Sabja (L.N)	Malharrao/ Naikpod/Jangapa Narayana	SMPU/ CRI-Hyd12084	Leaves	Ear-ache; 4 drops of pounded leaf juice used as eardrops to cure ear pain
S. cordata (Burm.f.) Borssum/Malvaceae/ Herb	Gayapuvaku (LN)	Malharrao/ Naikpod/Jangapa Posaih	SMPU/ CRI-Hyd12085	Leaves	Cut and wounds; external application of leaf paste on affected area
A. indicum (L.) Sweet/Malvaceae/ Shrub	Kanghi (UN)/ Botlabenda (LN)	Boggu Vagu/ Naikpod/Jangapa Narayana	SMPU/ CRI-Hyd12087	Leaves and seeds	Malarial fever; oral administration of 5 g pounded leaves daily two times for a week claimed to cure malarial fever Low sperm count; consuming dried seeds increases the sperm count
S. oleosa (Lour.) Oken/Sapindaceae/ Tree	Pusuku (LN)	Boggu Vagu/ Naikpod/Jangapa Posaih	SMPU/ CRI-Hyd12088	Bark	Stomach ulcers; bark powder of the *S. oleosa* and *S. cumini* are mixed in equal quantity. Oral administration of 5 g of the mixed powder daily up to 1 month duration Chest pain; oral administration of 4–8 g bark powder daily for 1 week relieves from chest pain
A. caesia (L.) Willd./Mimosaceae/ Climbing shrub	Korintha (LN)	Boggu Vagu/ Naikpod/Jangapa Posaih	SMPU/ CRI-Hyd12089	Bark	Cough; consuming 5 g of bark powder relieves from severe cough
B. superba Roxb./ Fabaceae/Woody twiner	Teega Moduga (LN)	Boggu Vagu/ Naikpod/Jangapa Posaih	SMPU/ CRI-Hyd12093	Red color exudates	UTI; consuming red color exudates obtained by incision on the stem, claimed to relieve from the burning micturition

UTI: Urinary tract infection, UN: Unani name, LN: Local name, *I. cairica: Ipomoea cairica, X. xylocarpa: Xylia xylocarpa, H. pubescens: Holarrhena pubescens, E. alsinoides: Evolvulus alsinoides, B. ceiba: Bombax ceiba, S. auriculata: Senna auriculata, M. tinctoria: Morinda tinctoria, S. virginianum: Solanum virginianum, T. grandis: Tectona grandis, C. swietenia: Chloroxylon swietenia, C. viscosa: Cleome viscosa, B. serrata: Boswellia serrata, E. monogynum: Erythroxylum monogynum, A. precatorius: Abrus precatorius, E. antiquorum: Euphorbia antiquorum, C. viminale: Cynanchum viminale, A. salviifolium: Alangium salviifolium, W. volubilis: Wattakaka volubilis, E. prostrata: Eclipta prostrata, T. arjuna: Terminalia arjuna, A. mexicana: Argemone mexicana, T. portulacastrum: Trianthema portulacastrum, L. parviflora: Lagerstroemia parviflora, H. suaveolens: Hyptis suaveolens, A. indica: Aristolochia indica, O. basilicum: Ocimum basilicum, S. cordata: Sida cordata, A. indicum: Abutilon indicum, S. oleosa: Schleichera oleosa, A. caesia: Acacia caesia, B. superba: Butea superba, S. cumini: Syzygium cumini, A. paniculata: Andrographis paniculata, P. pinnata: Pongamia pinnata, M. pruriens: Mucuna pruriens, C. zeylanica: Capparis zeylanica, C. orchioides: Curculigo orchioides, C. gigantea: Calotropis gigantea, T. cordifolia: Tinospora cordifolia*, SMPU: Survey of Medicinal Plants Unit

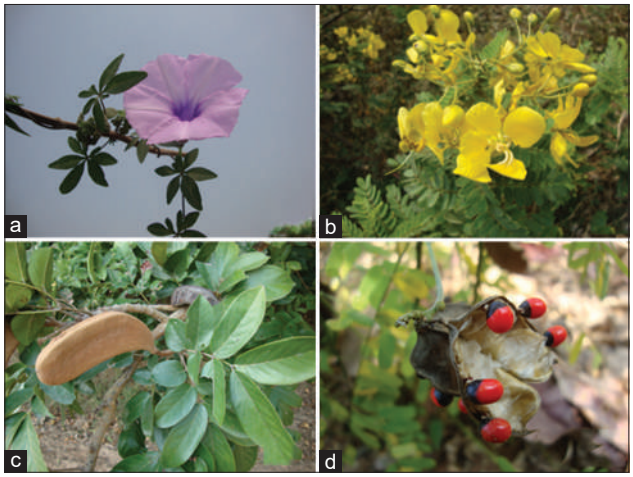

Figure 4: Some important medicinal plants in Jayashankar Bhupalpally area: (a) *Ipomoea cairica* (L.) Sweet, (b) *Abrus precatorius L*., (c) *Xylia xylocarpa* (Roxb.) Taub., (d) *Senna auriculata* (L.) Roxb.

Enumeration of folk medicinal species

The taxa used as a folk medicine are arranged in alphabetical order. Their botanical name, family, voucher specimen number, Unani name (wherever available), local name, habit, name of disease(s), method of preparation, administration, and name of informant and their ethnic community are given in Table 1.

Results and Discussion

Traditional botanical knowledge (TBK), broadly speaking, includes all types of knowledge pertaining to the identification, processing, and management of plants used in subsistence, material culture, and medicine. TBK is the overall botanical knowledge held by any nonindustrial community, and it also includes its original, spiritual, and sociological context as well. Besides cognitive aspects of

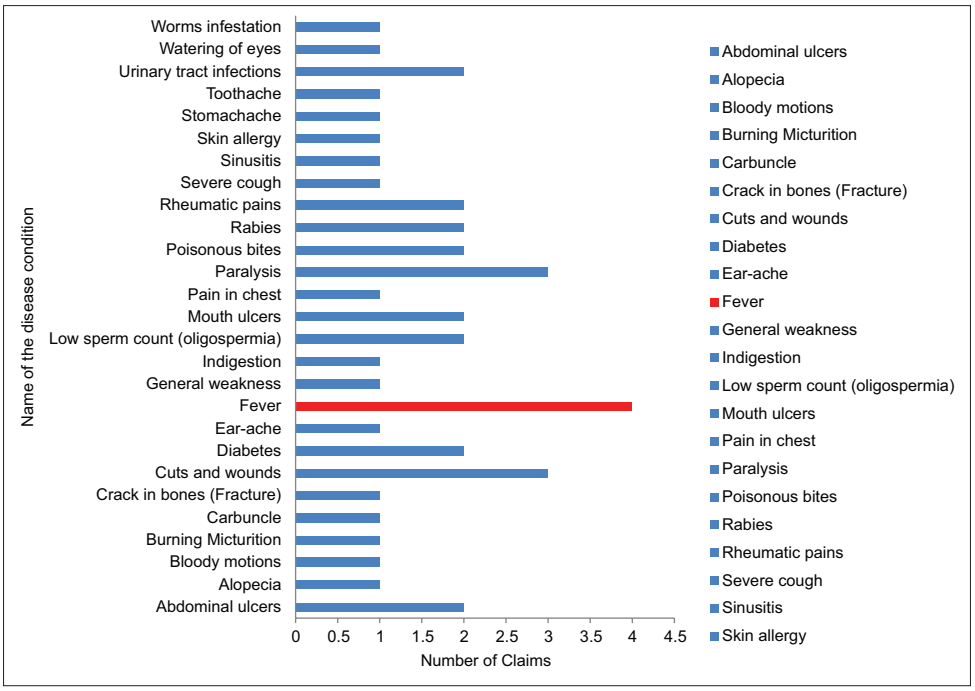

Figure 5: Frequency of claims on different disease conditions

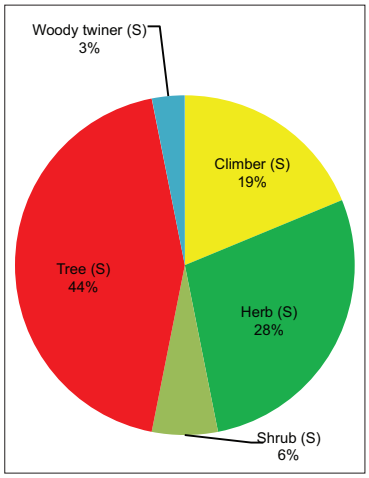

Figure 6: Habit and utilization (%) of folk medicine

plant use, it also incorporates the utilitarian, ecological as well as the vegetation management.[13]

The knowledge of using the medicinal plants as ethnomedicine is primarily derived from two streams of knowledge, either through the codified systems such as Ayurveda, Siddha, and Unani or through folk medicinal uses. The tribal communities are the megastore of traditional knowledge. The uniqueness of the Indian medical heritage lies in the fact that both ways of knowledge are living traditions. Documenting the indigenous knowledge through ethnobotanical studies is important for the conservation of biological resources as well as their sustainable utilization.[1,3] This legacy coexisted for centuries and enjoyed a relationship between mankind and plants. The present study discussed the age-old practices of using the medicinal plants against the common diseases by the Naikpod tribal inhabitants of the Bhupalpally area of TS.

Nearly 46 contemporary folk medicinal claims comprising 32 plant species belonging to 26 families were recorded from the study area. The Bhupalpally area showed a good extent of medicinal plant diversity. These medicinal plants are being used traditionally as folk medicine by the Naikpod tribes [Table 1 and Figure 4]. Previous reports on the folk medicinal claims of different districts of Telangana and adjoining areas provide substantial evidence of the presence and use of the medicinal plants by different tribal communities.[14-16] However, no systematic survey has been undertaken specifically on the use of folk medicinal plants by the Naikpod tribes in the Bhupalpally area, except for a few reports on the folk medicinal plants used by the Koya tribes of Malluru and Rajupeta villages which are the of the Godavari River.[3,17]

The area showed a good extent of medicinal plant diversity. These medicinal plants are being used traditionally as folk medicine by the Naikpods tribes of the Jayashankar Bhupalpally area. The tribes used the folk medicine for the treatment of 32 different disease conditions including abdominal ulcers, worm infestation, poisonous bites, urinary tract infection with burning micturition, carbuncle, crack in bones (fracture), cuts and wounds, diabetes, earache, fever, gonorrhea, alopecia, general weakness, mouth ulcers, pain in chest, paralysis, rabies, rheumatic pains, severe cough, sinusitis, skin allergy, low sperm count (oligospermia), stomachache, syphilis, toothache, and watering of eyes [Table 1].

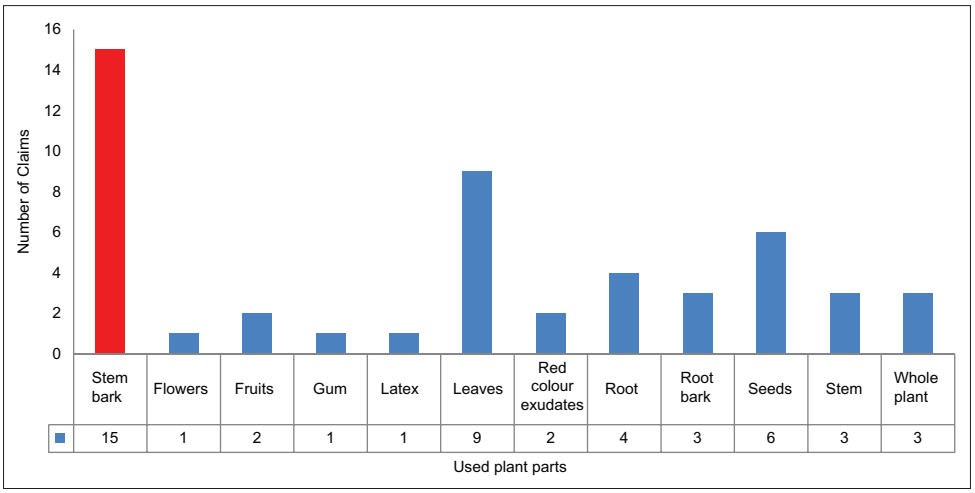

Figure 7: Frequency of folk medicinal claims on whole plant or part

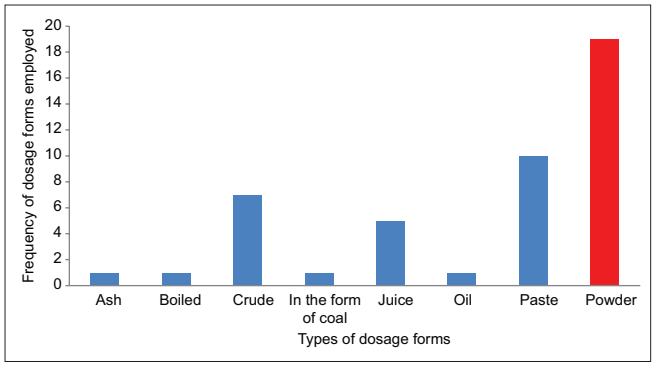

Figure 8: Frequency of dosage forms

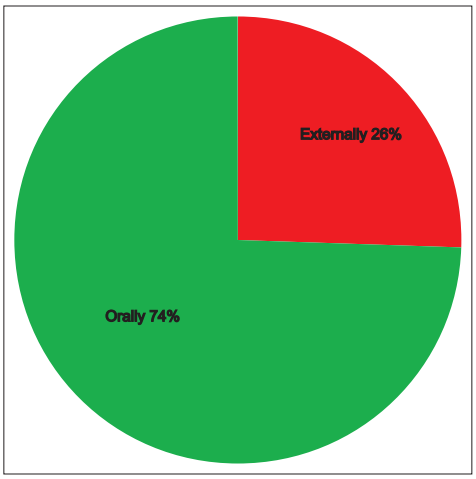

Figure 9: Mode of drug administration

Maximum claims (4) were found for the treatment of fever followed by paralysis, cuts, and wounds (3 each), while two claims were recorded for abdominal ulcers, low sperm count (oligospermia), poisonous bites, bone fracture, and diabetes [Figure 5].

The tribal inhabitants used the major drug source as trees (maximum – 14), followed by herbs (9), climbers (6), shrubs (2), and woody twiner (minimum – 1) [Figure 6].

Among the different plant parts used for the preparation of folk medicine, the most frequently utilized plant parts were found to be stem bark (15), leaves (9), seeds (6), and root (4) followed by whole plant, stem, and root bark (3 each). Various plant parts such as; fruits, flowers, and gum, along with plant secretions like latex and red-colored exudates, were used in folk medicine [Figure 7]. Most of the plant origin drugs were administered in the form of powder (19), followed by paste (10), crude form (7), juice (5), ash, coal and oil [Figure 8]. Of all these claims, nearly 74% of the folk medicines were used internally and 26% externally. External applications were employed mainly to relieve cuts, wounds, and rheumatic pains [Figure 9 and Table 1].

The data collected during the study have also been compared and correlated with some recent and past available reports.[1,2,6,7,12,15,16-39] It has been noticed that most of the documented claims are new and their mode of application, ingredients, and parts used are quite different from earlier published reports.

Conclusion

The Naikpod tribes living in the remote areas of the Jayashankar Bhupalpally area have potential traditional knowledge. These people not only depend on medicinal plants as a source of medicine to deal with different disease conditions but have also developed methods of resource management for other purposes, including food, fodder, and fuel.

It would be a great asset if this traditional knowledge may be subjected to scientific validation by advanced pharmacological and clinical studies with the consent/involvement of knowledge holders. Such investigations could draw attention to the discovery of newer drugs of plant origin for the treatment of different diseases, for which there is little or no adequate cure available in the modern medicine.

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Conflicts of interest

There are no conflicts of interest.

References

1. Husain MK, Pratap GP, Aminuddin, Kazmi MH, Rahman R. Folk-claims on medicinal plants in kammarpally forest range of Nizamabad forest division of Telangana State. Hippocratic J Unani Med 2016;11:113-29.
2. Husain MK, Pratap GP, Aminuddin, Kazmi MH. Ethnopharmacological Survey of Unani Medicinal Plants in kammarpally Forest Range of Nizamabad District of Telangana, National Seminar on Unani Medicine and Tibb-e-Nabwi (SAWS), Souvenir and Abstract; 2015. p. 7.
3. Husain MK, Pratap GP, Aminuddin, Kazmi MH. Ethnopharmacological uses of medicinal plants in Jannaram forest division of Telangana, India. Hippocratic J Unani Med 2015;10:122-33.
4. Mitalaya KD, Bhatt DC, Patel NK, Didia SK. Herbal remedies used for hair disorders by tribals and rural folk in Gujarat. Indian J Tradit Knowl 2003;2:389-92.
5. Kala CP. New Delhi. J Ethnobiol Ethnomed 2005;1:11.
6. Pratap G, Husain M, Kazmi M, Sudarsanam G, Prasad G. Ethno-medico documentation of medicinal plants in Madanapalle mandal of Chittoor District, Andhra Pradesh. Indian J Ayurveda Integr Med KLEU 2018;1:11-1.
7. Pratap GP, Husain MK, Sudarsanam G, Alam M, Khair S, Kazmi MH. Ethnomedicinal plants used by tribes of Chittoor District of Andhra Pradesh to cure muscular pain and inflammation. Int J Ayu Pharm Res 2018b;6:8-16.
8. Odelu G. Preliminary studies on medicinal plants of Huzurabad division, Karimnagar District, Telangana, India. Int J Innov Res Sci Eng Technol 2015;4:4483-92.
9. Mehta BH. Gonds of the Central Indian Highlands. New Delhi: Concept Publishing Company; 1984.
10. Murali A. Tribal armed rebellion of 1922-1924 in the Madras presidency: A study of causation as colonial legitimation. In: Bates C, editor. Savage Attack: Tribal Insurgency in India. London: Taylor & Francis; 2017.
11. Gamble JS. Flora of the Presidency of Madras. Vol. I-III. London, Botanical Survey of India, Calcutta: Allard and Co.; 1936. [Reprinted edition].
12. Jain SK, Rao RR. A Handbook of Field and Herbarium Methods. New Delhi: Today & Tomorrow's Printers and Publishers; 1977.
13. Cotton CM. Ethnobotany: Principles and Applications. UK: John Wiley & Sons; 1996.
14. Suthari S, Vatsavaya SR, Majeti NV. Ethnobotanical explorations in Telangana, the youngest state in Union of India: A Synoptic Account. Ozturk M, Hakeem KR. Plant and Human Health. Vol. 1: Ethnobotany and Physiology. Switzerland: Springer International Publishing AG; 2018.
15. Kumar AP, Rao NB. Ethno botanical survey of medicinal plants by naikpod tribes of Surbiryal Village, Nizamabad District, Telangana, India. Eur J Pharm Med Res 2015;2:254-62.
16. Dinesh, V, Sharma PP. Traditional uses of plants in indigenous folklore of Nizamabad District, Andhra Pradesh, India. Ethnobotanical Leaflets 2010;2010:5.
17. Gurrapu S, Ramya C, Naik JS, Kumar PR, Mamilla D, Mamidala E. An ethnobotanical survey of medicinal plants used by traditional healers of Jayashanker Bhupalpally District, Telangana. Int J Pharm Res Health Sci 2018;6:2245-9.
18. Council of Scientific & Industrial Research. The Wealth of India (Raw Materials). New Delhi: Council of Scientific & Industrial Research; 1976.
19. Contributions to the Unani Medicinal Plants from North Arcot District, Tamil Nadu. New Delhi: Central Council for Research in Unani Medicine; 1992.
20. Seth SK, Champion HG. Revised Survey of the Forest Types of India. New Delhi: Government of India Press; 1963.
21. Chetty KM, Rao KN. Ethnobotany of Sarakallu and adjacent areas of Chittoor district. A P Vegetos 1989;2:51-8.
22. Dinesh V, Sharma PP. Plants used for bone fracture by indigenous folklore of Nizamabad District, Andhra Pradesh. Int Multidiscip Res J 2012;2:14-6.
23. Gupta VC, Mirza MA, Singh VK, Aminuddin, Siddiqui MA. Ethnomedicine in Sirsailam forest of Kurnool District; Andhra Pradsesh. Hippocratic J Unani Med 2007;2:7-13.
24. Gupta VC, Singh VK, Aminuddin. Ethnomedicines in Adilabad forests of Adilabad District, Andhra Pradesh. Hippocratic J Unani Med 2008;3:91-6.
25. Gupta VC, Ahmad M, Singh VK, Aminuddin, Rasheed NM, Khanum A. Ethnobotanical studies of Nalgonda District of Andhra Pradesh. Hippocratic J Unani Med 2010;5:95-105.
26. Hemadri K, Sarma CR, Rao SS. Medicinal plant wealth of Andhra Pradesh – Part I. Anc Sci Life 1987;6:167-86.
27. Hemadri K, Sarma CR, Rao SS. Medicinal plant wealth of Andhra Pradesh – Part II. Anc Sci Life 1987;7:55-64.
28. Hemadri K. Contributions to the medicinal flora of Srikakulam District, Andhra Pradesh. Indian Med 1991;3:17-34.
29. Hussain A, Virmani OP, Popli SP, Mishra LN, Gupta, MM, Srivastava GN, *et al*. Dictionary of Indian Medicinal Plants. Lucknow: Central Institute of Medicinal and Aromatic Plants; 1992.
30. Jain SK. Dictionary of Indian Folk Medicine and Ethnobotany. New Delhi: Deep Publications; 1991.
31. Kumar RV, Pullaiah T. Medicinal plants used by the tribals of Prakasm District, Andhra Pradesh. Ethnobotany 1998;10:97-102.
32. Lingaiah M, Nagaraja PR. An ethnobotanical survey of medicinal plants used by traditional healers of Adilabad District, Andhra Pradesh, India. Biolife 2013;1:17-23.
33. Murthy EN. Ethno medicinal plants used by gonds of Adilabad District, Andhra Pradesh, India. Int J Pharm Life Sci 2012;3:2034-43.
34. Nagaraju N, Rao KN. A survey of plant crude drugs of Rayalaseema, Andhra Pradesh, India. J Ethnopharmacol 1990;29:137-58.
35. Pratap GP, Khanum A, Aminuddin, Sudarsanam G, Husain MK. Ethnopharmacological studies among the tribal communities of Udyagiri forest division of Nellore District, Andhra Pradesh. Hippocratic J Unani Med 2014;9:95-107.
36. Pratap GP, Prasad GP, Sudarsanam G. Ethno medical studies in Kailasagirikona forest range of Chittoor District, Andhra Pradesh. Anc Sci Life 2009;29:40-5.
37. Pratap GP, Prasad GP, Sudarshanam G. Ethno medical studies in Talakona forest range of Chittor District, Andhra Pradesh. Anc Sci Life 2009;28:42-9.
38. Rao NS, Rajasekhar D, Raju KV, Rajau DC. Ethnomedicinal therapy among the Chenchus of Nellamallai hills forest of Andhra Pradesh. Biosci Res Bull 1992;11:81-5.
39. Vedavathy S. Status of plant genetic resources and ethnobotanical information in Chittoor district AP MFP News.1998;8:13.

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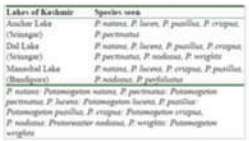

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