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A Comprehensive Review on Traditional Uses, Chemical Constituents and Pharmacological Properties of *Bartang* (*Plantago major* Linn)

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ABSTRACT

Introduction: *Bartang* (*Plantago major)* is a widespread used medicinal plant from the Plantaginaceae family and is widely used since ancient times, to manage a wide range of diseases. In the recent years synthetic drugs have been widely replaced with herbal medicines and plant extracts because of their little undesirable and extensive beneficial effect. Phytochemical investigations showed that *Plantago major* contains volatile compound such as Triterpenoids, Phenolic acids and Flavonoids. **Objective:** To emphasize *Bartang* (*Plantago major)* therapeutic benefits on human health.**Methods:** In this review study, medicinal properties of Plantago major are collected from credible pharmacopeia's, textbooks of Classical Unani Literature belonging to the 10-18th century AD, such as "The Canon of Medicine", "Makhzan-Al- Advia" and so on. Moreover, electronic databases including Scopus, Medline and Web of science were explored for this purpose.**Conclusion:** *Bartang* has acclaimed therapeutic effect as Wound Healing *(Mudammil)*, Antipyretic *(Dafi'-i-Humma)*, Antitussive *(Dafi ul Sual)*, Anti-Infective *(Dafi'-i-* Ufūnat*)*, Anti-Haemorrhagic *(Habis-i-Dam)*, Anti-Inflammatory *(Muhallil)*, Diuretic *(Mudirr)*, Laxative *(Mulayyin)*, Astringent *(Qabid)*, Analgesic *(Musakkin)*, Phytoestrogen and Androgenic properties. *Bartang* is used specially in treatment of anaemia. This review paper explores the potential medicinal uses of *Bartang* in detail. However further studies needed to explore its phytoconstituents and their pharmacological potential. Furthermore, clinical studies are needed to use this plant for benefits of human beings.

Keywords: *Bartang*, *Plantago major*, Unani medicine, Triterpenoids, Phenolic acids, Flavonoids.

INTRODUCTION:

Bartang (*Plantago major*) is a commonly grown medicinal herb belonging to the Plantaginaceae family.[1] *Bartang* is also known as plantain, waybread, or dooryard plantain.[2] The plant is native to the majority of Europe, as well as Northern and Central Asia, and has spread greatly over the world.[3] *Plantago major*, claimed by researchers, has been around for around 4000 years.[1] It is a perennial herb found in the temperate and alpine Himalaya from Krshner to Bhotan, as well as up to 4000 metres in Baluchistan, Sri Lanka. Burma, the Malay Peninsula stretching to Afghanistan, and westward to the Atlantic. In India, it thrives in Maharashtra and Andhra Pradesh's Khasia Hills.

Flowering and fruiting take place throughout July-September.[4] The plant's leaves and seeds have been widely used in folk medicine for a variety of purposes, including the treatment of a wide range of illnesses and disorders like digestive system affections and respiratory complications.[3] *Plantago major* L. is typically found in low-nutrient soils that are deficient in potassium and phosphorus.[5] It is widely distributed along roadsides, trails, and other locations where soil compaction occurs because it outgrows the majority of other plants in these conditions. It is also frequently found as a weed in crops and in grasslands. It is mainly propagated by seeds, which are held on long, narrow spikes that rise well above the foliage. It is wind-pollinated.[3]

Through phytochemical analysis *Bartang* (*Plantago major*) was found to contain flavonoids, triterpenoids, phenolic acids, and volatile compounds through phytochemical analyses.[1] Plantago plants are rich in phenol toms, and it's possible that these compounds give the plant its potent antioxidant properties.[5] Moreover, this herb can be used to treat anaemia and has antifungal, analgesic, anti-haemorrhage, anti-inflammatory, phytoestrogen, and androgenic therapeutic qualities.[1,6]

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Scientific Classification[7]

Phylum- Plantea
Division- Trachophytes
Class- Angiosperm
Order- Lamiales
Family- Plantaginaceae
Genus- Plantago

Vernacular names[4,8]

English	Plantain
Hindi	*Lahuriya, Baltang*
Arabic	*Lisan ul Hamal,Zanbul Far ,Zanbul Yarbooa*
Persian	*Khargholah,Charghoon*
Urdu	*Bartang*
Kashmiri	*Gula*

Description: *Plantago major L*. is a perennial plant that belongs to the Plantaginaceae family. It can become about 15 cm high, but the size varies a lot depending on the growth habitats.[9]

Images:[10,11]

Figure No: 01

Bartang Plant

Figure No: 02

Tukhm e Bartang

Leaves: This is a perennial herb that exhibits an upright and robust rootstock. The leaves are petioled, radical, and alterative, measuring between 2.5 and 125 cm.[9] Each leaf is oval, 5-20 cm long and 4-9 cm wide, with an acute apex and smooth margin. There are five to nine conspicuous veins.[3] (Figure No.01)

Flowers: The flowers are typically arranged in long, slender, rather lax spikes measuring 5-15 cm, with long bracts measuring 1.5-2 mm in length, either shorter or equal to the calyx, ovate-oblong and obtuse, with scarious margins. The calyx has glabrous sepals that are oblong, obtuse or subacute, obtusely keeled on the back, margins that are broadly scarious, and the corolla has a length of 4mm, with long glabrous lobes that are lanceolate and possess acute reflexes. The colour of the anthers is purple. The capsule is ovoid, 3-4mm, and long glabrous, splitting transversely near the base. The top comes off as a conical lid tipped with the remains of the style.[8](Figure No.01)

Seeds: The seeds are minute in size and shape, measuring 0-8-1-5 mm in length and 0-48-0-8 mm in width. Their colour ranges from light brown to dark brown or almost black. Upon soaking in water, the seed coat swells and the seeds become enveloped in a colourless mucilage. The seeds have a slightly bitter and oily flavour. The mucilaginous flavour is not discernible.[9,12] P. major is pollinated by wind, and large amounts of seeds are produced, up to 20000 per plant.[9](Figure No.02)

Microscopic: The sections of the seeds prepared show that the Testa of the seed comprises of two layers. The outer layer is of epidermis, consisting of translucent thin-walled cells filled with mucilage. These are irregular rectangular cells. The cells in surface view measure 9-21-40x9-19.8-27M in size.

The epidermis in section view shows rectangular cells measuring 6.90-10.58-11.50x4.6- 7.8-11.50M. Bellow the epidermis is found the pigment layer, these are also having rectangular cells and are found to be filled up with brownish pigment. The pigment layer cells in surface view measure 18.4-26.22-32.2x9.2-16.10-19.95M. in size, In transverse sections the Testa is found to be 27-45M thick. Under the pigment layer is found the endosperm which surrounds the embryo. The cotyledonary cells are polygonal in shape and are smaller near the outer margins and increasing in size towards the middle their size being 11.50-17.48-230.0x9.2-15.64-20.70M. The cells lumen is found to be filled up with oil and protein globules. The embryo is straight and lies in the middle along the axis. These are filled with globular mass of aleurone grains.[4,8]

***Mizaj* (Temperament):** [8,13] Sard o khushk 2^0

***Afa'al* (Actions):** *Qabiz* (Astringent)**,** *Habis* (Styptic), *Muharrik* (Stimulant), *Muaddil* (Alterative), *Mudirre-Baul* (Diuretic), *Musakkin-i-Alam* (Analgesic), *Radi* (Repellent), *Musakkin-i-Atash* (Thirst quenching), *Mufattih-i-Uruq* (Vasodilator)**,** *Muqawwi-i-Jigar* (Hepatotonic). [13,14,15]

***Istemal* (Uses):** *Bawasir Damiya* (Bleeding Piles)**,** *Kathrat-i-Hayd* (Menorrhagia)**,** *Ru'af* (Epistaxis)**,** *Litha Damiya* (Bleeding Gums)**,** *Ramad* (Conjunctivitis)**,** *Fasad al-Hadm* (Dyspepsia)**,** *Sill o diq* (Phthisis)**,** *Sozak* (Gonorrhoea)**,** *Da' al-Fil* (Elephantiasis/Filariasis)**,** *Da'al-Tha'lab* (Alopecia Areata)**,** *Waja' al-Udhun* (Otalgia), *Nar Farsi* (Eczema).

Nafe khas: [13] *Kathrat-i-Hayd* (Menorrhagia). [8,13,14]

***Miqdar Khorak* (Dose): Leaves**: 4-14 *Tola* and **Seeds**:10 *Masha* [15]

***Muzir* (Adverse effect):** Lungs, spleen [13,15]

***Musleh* (Corrective):** *Shahd* **,** *Mastagi, Kateera* [8,15]

***Badal* (Substitute):** *Isaphgol, Barg e himaz bustani* [8,14]

***Murakkabat* (Compound Formulations):** *Safoof Teen* [13]

***Bartang* in Unani System of Medicine**

- The leaves of Bartang resembles like the tongue of goat therefore it is also called as *lisan ul hamal*. It is also known as *kaseer ul izlaa* (polygon) and *zusabat ul izlaa* (heptagon).

- Ibn Sina in his book al qanoon states that bleeding which is hot Bartang is the best drug for it in fact no medicine act better than Bartang.

- Diascaridous mentioned it Joshanda is use in stomach pain due to heat.

Traditional Uses: Plantago has a number of unique properties that makes it suitable to be widely used in traditional medicine around the world. This perennial herb has been used as a traditional medicinal plant for centuries to treat several illnesses including colds, hepatitis, skin diseases, infectious diseases, problems related to the digestive organs, respiratory organs, reproduction, circulation, and it is used to reduce fever.[5] The traditional use of P. major in wound healing is quite old. It was described by the Greek physician that the leaves were prescribed for treatment of dog bites From the 'Volsunga saga' it is known that the Vikings used P. major leaves for wound.[9] In Colombia, Italia decoction of the whole plant was healing different kinds of wounds such as (snake bite, intestinal worms and infectious wounds), cold, diabetes. In India Seeds of plant were used mouth inflammation eye inflammation. In Iran Oral use of the extract was used as remedy for tuberculosis soothing effect, extract of the root was used in the treatment of Urinary tract infection, toothache, brewed leaves and root were remedy for Ear pain.[3]

Phytochemical Properties: *P. Major* contains biologically active compounds such as Polysaccharides, Lipids, Caffeic Acid Derivatives, Flavonoids, Iridoid, Glycosides and Terpenoids. Alkaloids and some organic acids have also been detected. A range of biological activities has been found from plant extracts including Wound Healing Activity, Anti-Inflammatory, Analgesic, Antioxidant, Antibiotic, Immune Modulating and Antiulcerogenic Activity.[9]

Anti-Inflammatory: Methanol extract of P. major L. seeds was assayed on carrageenan-induced rat paw oedema to evaluate the anti-inflammatory activity. P. major showed anti-inflammatory effect in a dose dependent fashion, but it was not more effective than indomethacin. It could be thought that inhibition of Cyclooxygenase-2 (COX-2)-catalyzed prostaglandin biosynthesis may be

the involved mechanism for the anti-inflammatory action Furthermore, flavonoid derivatives which are high in P. major are other responsible constituents present in the plant. [3,16]

Antidiarrheal Effect: In a study, the effect of ethanolic extract of Plantago Leaves was evaluated on castor oil-induced diarrhoea and gastrointestinal movements in rats (charcoal meal) and on the motility of duodenum isolated from freshly slaughtered rabbits. P. major dose of 200mg/kg (oral) demonstrated significant antidiarrheal effect for at least 4h.[3,17]

Anti-Ulcerogenic Effect: In screening anti-ulcerogenic activity of *P. major*, methanol extract of the plant was assayed using ethanol and aspirin-induced gastric ulcerations in rat models. Leaf and seed extracts were prepared separately to observe the difference in their pharmacological actions. In alcohol induced ulcer models, the leaf extract significantly decreased the ulcer index with curative ratio of 87.50% but the seed extract had no considerable effect in the same model.[3,7]

Antioxidant Effect: Ethanolic, hot and cold-water extracts of P. major leaves and seeds were assayed for determination of free radical-scavenging activity using stable 1, 1-diphenyl-2-picryl hydrazyl radical (DPPH)in vitro. Highest antioxidant activity was observed with the ethanolic leaf extract even at a low concentration of 20 ppm (78% activity). In the same concentration the ethanolic seed extract had really low activity (25%). The antioxidant activity of both mentioned extracts increased in a concentration-dependent fashion, up to 60 ppm. The rate of antioxidant activity for both extracts was so close in a concentration of 100ppm. Hot and cold-water extracts of Plantago leaves were more effective than the seed extract.[3,18]

Antibiotic: Ethyl alcohol extract showed antibacterial activity against E. coli and Bacillus cereus and acetone extract was effective on bacteria species (Bacillus cereus, Bacillus subtilis, Staphylococcus aureus, Staphylococcus epidermidis, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa, Proteus mirabilis, Salmonella enteritidis) in different concentrations.[1,19,20]

Hepatoprotective: The hepatotoxic effects of Carbon Tetrachloride (CCl4) are due to its enzymatic activation to trichloromethyl (CCl3 ï) free radical, which is turn disrupts the structure and function of lipid and protein macromolecules in the membranes of the cell organelles, and induces microsomal lipid peroxidation leading to fatty liver. In this respect, hepatocyte damages following acute CCl4 exposure is abrogated in experimental animals pretreated with antioxidants, such as vitamin E, demonstrating the role of oxidative activity of the trichloromethyl radical metabolite. [1,16,21]

Anticancer: Methanolic Plantago major extract was evaluated for cytotoxic activity against three human cancer cell lines including the human renal adenocarcinoma (TK-10), the human breast adenocarcinoma (MCF-7) and the human melanoma (UACC- 62). Flavonoids, flavone and luteolin are the main factors in cytotoxic activity. Plantago major may be partially effective in preventing carcinogenesis.[1,3,22]

Wound Healing Effect: Plantago major was used in wound healing and the leaves were used as a remedy of wounds. In an animal study, water extract of Plantago major is recommended as a suitable substitute for silver sulfadiazine, especially when applied in 50% concentration in wound burn healing. Polyphenols especially planta major are considered as the main significant compounds for wound healing. [1,3 ,23]

Safety and toxicity: Plantago major is not among the most toxic of plants. Analysis of the anti-nutritional and toxic components showed low content of oxalic acid (6736 mg) and erucic (3.45%) in Plantago major extract. Furthermore, Lethal concentration (LC50) and LD50 for Plantago major were determined as 4.74 (µg/mL) and 182.54 (mg/kg) and median effective dose (ED50) value of Plantago major was found to be 7.507 mg/kg.[1,3]

Conclusion: *Bartang* has been utilised for a range of indications since ancient time. Several phytochemicals, experimental and clinical research have been conducted on it. Studies have proved its wound healing activity, anti-inflammatory, analgesic, antioxidant, antibiotic, immune modulating and antiulcerogenic activity. Not much work has been done on *Bartang* in Unani System of Medicine , therefore it is necessary to conduct experimental trails on *Bartang*.

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