

Review Article

Pushkarmoola (Inula racemosa Hook. F.) a potent Anti-pyretic herb: A medico-historical overview

ABSTRACT

Pushkarmoola, scientifically known as *Inula racemosa* Hook. F., is a robust herb belonging to the Asteraceae family. It is renowned for its potent medicinal properties, particularly in the realm of cardio-pulmonary health. In contemporary times, it enjoys significant recognition and popularity in both folk and traditional medicinal practices. Its versatility in addressing various health conditions such as fever (*Jwara*), cardiac diseases (*Hridroga*), wasting (*Kshaya*), cough (*Kasa*), respiratory diseases (*Svasa*), and tuberculosis (*Rajyakshma*) has been firmly established over the years through a combination of traditional wisdom and scientific investigation. This article provides a concise overview of the historical significance of Inula in medicine. Inula is a valuable source of natural compounds, and this article delves into the details of its phytoconstituents, specifically alantolactone and isoalantolactone. It covers their pharmacological, biochemical, and clinical studies conducted in both in-vitro and in-vivo settings. Furthermore, it places particular emphasis on Inula's widespread use in Ayurvedic literature, particularly as a remedy for fever (*Jwara*). Researchers and clinicians have taken note of this extensive application, and this article aims to collate and document comprehensive information on various aspects of Inula while underlining the necessity for further research and development.

Keywords: Inula, Pushkarmoola, Ayurveda, Alantolactone, Isoalantolactone.

1. INTRODUCTION

A *bheshaja* is a substance through which we can overcome the fear of disease it can also called *asausadha*. According to *Acharya Charaka* the following are the four indispensable for treatment of diseases, namely *Bhisaka*(Physician), *Dravya* (Medicament), *Upasthata*(attendant / nursing personal), *Rogi* (patient). These are the *CikitsaCatuspada* (analogous to four legs) that support a table. Applicability, richness of quality, abundance, and utility in multipurpose are said to be the best qualities of a drug. Hence *Bhesaj* is kept in second position among the *pada catustaya* because of its great role in treatment grounds.

A substance which is the constituent cause of its action and properties residing in it is known as a *dravya*. *Acharya Charaka* had told that with proper (right method of) preparation a poison can act as an excellent medicine. Medicine if improperly used becomes a severe poison. As per this advice, in this world, there are many objects with medicinal properties, which ever substances (drugs) are available, use them judiciously, for serving the purpose in hand. Drugs are of three types: *Shamana* (producing subsidence), *Kopana* (producing aggravation) and *Swasthahitam*(maintaining health). A drug not perfectly understood is (fatal) like poison, weapon, fire and thunderbolt; a perfectly understood drug is (life saver) like ambrosia.

Acharya Charaka in *Sutra Sthana* has told that a drug whose name and form and properties are not known, and when known, if improperly used can produce disaster. One who knows uses, names and form is known as *Tatvavita* (knowledgeble), then what would be a *Bhisaka*(physician) called, who knows everything about medicine. Specific knowledge about *ausadhi*(drugs) is obtained through scientifically based discussions.

Knowledge of drug is important before it usage, otherwise it can give a negative impact on our body. Knowledge of a drug includes its botanical name, family, Habit, Habitat and its *Rasa pancaka* etc.

2. PUSHKARAMOOLA (*INULA RACEMOSA HOOK.F.*) (ASTERACEAE)

2.1. Vernacular Names⁽¹⁾:

- English – Indian elecampane, sunspear
- Hindi – Pokharmul
- Sanskrit – Puskara mula, kasmira, Padma.
- Gujarati – Pokharmul

- Telugu – Pushkara mulamu
- Kannada – Puskarmul
- Kashmiri – Poshkar
- Marathi – Pushkarmul
- Malayalam – Pushkarmulam
- Tamil –Puskarmulam

2.2 Synonyms Pushkaramoolain different Nighantus :

Kasmira, Padmapatra, Pouskara, Kustha, Bheda, Ciram, Jiham, Tirtha, Dhira, Padma, Puskarahava, Brahmatirtha, Mulam, Vatahva, Phala Patraka, Viram, Swasari, Sugandhikam, Mula, Pushkarjata

2.3 Basonym of Drug

पुष्पातीतिपुष्करं।पुषपुष्टौ।पोषयतिउदकादानाद्युपकारेणच।।⁽¹⁾

Pushkaramoola (*Inula racemosa* Hook.f) nourishes the person whouses it.

2.4 Synonyms

Habitat

1. काश्मीरा-काश्मीरेषुभवम्।⁽²⁾

Pushkaramoola grows in Kashmir region.

Morphology

2. पद्मपत्र- मुकुलितपद्मसदृशपत्राणिअस्य।

पद्मदलसदृशपत्राणिसन्त्यस्य।।⁽²⁾

Leaves of *Pushkaramoola* resemble floral bud of lotus flower or shape of petals of lotus flower.

Properties and Actions

3. कुष्ठभेदः - कुष्ठस्यभेदः, कुष्ठसमानगुणधर्मिणीवा।⁽²⁾

Properties and actions of *Pushkaramoola* is similar to Kustha

2.5 Taxonomic classification of Pushkaramoola⁽¹⁾:

- Kingdom : Plantae
- Class : Dicotyledons
- Subclass : Gamopetalae
- Series : Inferrae
- Order : Asterales
- Family : Asteraceae
- Species : Racemosa
- Botanical Name: *Inula racemose Hook.f*
- Kula : Bhringaraja Kula

2.6 Morphological characters⁽³⁾.

The plant is a sturdy shrub with broad leaves that are placed racemosely. All vegetative parts are scabrid tomentose and the stem is grooved. Lower leaves thin to form a leaf stack with wings. Upper leaves are stem-clasping and lanceolate. The face of the abaxial lamina is heavily tomentose. Radical leaves have long petioles and are elliptic-lanceolate in shape. The cauline leaves are smaller, semi-aplexicaule, and oblong. Large, shaded yellow daisies that bloom in the middle to end of summer make up the bottoms. They are born in a cluster resembling an apical spike. The fruits, slender achenes, 0.4 cm long, bearded with 0.75 cm long pappus hairs. Root stock branched; fresh roots are irregularly fusiform. Sometimes a number of roots are found in the collar zone, though usually few occur in each clump. These roots have a dull brownish skin with yellowish colour inside. They possess a sweet and somewhat camphoraceous odour and have a bitter taste

2.7 Geographical Source⁽⁴⁾

The plant is found in the Himalayas at elevations between 1500 and 4200 metres above sea level, from Kashmir to Kumaon, Afghanistan, and Central Nepal. It grows naturally in dense alpine scrub between 2700 and 3500 metres in the cold, dry environment of the northwestern Himalayas in Kashmir's Laddakh (Leh) area. Both in Kashmir and the Lahaul valley of Himachal Pradesh, domesticated varieties of the incipient cultigens are grown along the edges of wheat, barley, and buckwheat fields.

2.8 Phytoconstituents⁽⁵⁾

The roots contain Alantolactone, Isoalantolactone, Alloalantolactone, Inunal, Isoallalantolacton, Inunolide, Dihydroinunolide, Isoimunal, Alantodiene, Isoulantodiene: - Sitosterol, Aplotaxene, Phenylacetoneitrile, P-Cymene, 2-Furfural, Norbornyl Acetate, Benzaldehyde A-Pinene Oxide, A-Humulene, O-Farnesene, ArCurcumene, A-Ionone, Fionone And Other Sosques Aldehydes and Alcohols are reported from the essential oil of the root.

2.9 Gana Vargikarana (Classical Categorization)

Pushkarmoola is given as a drug of choice in different varga by different acharyas. Both Charaka samhitha and Ashtanga Hridaya included Pushkarmoola in swasaharavarga and hikkanihgrahanavarga. Sushruta include Pushkarmoola in the phalavarga. Nighantu of the different eras included Pushkarmoola in different varga such as haritakyadivarga, guduchyadivarga, aushadivarga, pippalyadivarga and satapushpadiavarga. (Table 1)

Table 1. Gana Vargikarana

| Nighantu | Varga |
|------------------------|---------------------------------------|
| Charaka Samhitha | Swasaharavarga, Hikkanihgrahana Varga |
| Sushruta Samhitha | Phala Varga |
| Vagbhata Samhitha | HidhmaNigrahana, Swasa Shamaka |
| Bhavaprakasha Nighantu | Haritakyadi Varga |
| Dhanwantari Nighantu | Guduchyadi Varga |
| Kaiydeva Nighantu | Aushadi Varga |
| Raj Nighantu | Pippalyadi Varga |
| Priya Nighantu | Satapushpadi Varga |

3.0 Pharmacological Properties with their Therapeutic Use of Pushkarmoola(Inula racemosaHook.f.)

The Pharmacological Properties with their Therapeutic Use of *Pushkarmoola(Inula racemosaHook.f.)* are mentioned as per Rasa Panchaka, which consists of Rasa, Guna, Virya, Vipaka and Prabhava in Ayurveda. According to different texts Rasapanchaka and Karma (actions) of Pushkarmoola mentioned [Table 2]

Table2. Pharmacological properties of Pushkaramoola (*Inula racemosa* Hook.f.)

| Samhitha/Nighantus | Rasa | Guna | Virya | Vipaka | Doshic property | Use/Action |
|---|-------------|---------------|-------|--------|-----------------|---|
| Dhanwantari Nighantu (Guduchyadi Varga) | Tikta | Laghu | Ushna | Katu | Kapha-Vataghna | Jwara, Arochaka Kasa, Shopha, Adhmana, Swasa, Hikka |
| Kaideva Nighantu (Aushadhi Varga) | Katu, Tikta | | Ushna | | KaphaVataghna | Kasa, Jwara, Shopha Aruchi, Swasa, Hikka Parswaruja |
| Bhavaprakasha (Haritakyadi Varga) | Katu, Tikta | Tikshna Laghu | | Katu | Vata-Kaphaghna | Shotha, Aruchi Swasa, Parswasoola |
| Raj Nighantu (Pippalyadi Varga) | Katu, Tikta | | Ushna | | KaphaVataghna | Jwara, Swasa, Arochaka Kasa, Shopha, Pandu |
| Priya Nighantu (Satapushpadi Varga) | Katu, Tikta | | Ushna | | | Madavaham, Hridya, Kasa, Swasa, Parswa, Shoola |

3.1 PUSHKARAMOOLA IN VARIOUS SAMHITHAS

The "Brihatrayi," also known as the "Three Great Classics of Ayurveda," refers to a trio of ancient Indian texts that are foundational to the practice of Ayurvedic medicine. These texts are considered the most authoritative and comprehensive sources of Ayurvedic knowledge and are highly respected in the field. Charaka Samhitha: Attributed to the sage Charaka, covers a wide range of topics, including fundamental principles of Ayurveda, diagnostics, classifications of diseases, and detailed descriptions of herbal medicines and treatments. The Charaka Samhita places a strong emphasis on preventive medicine and holistic health. Sushruta Samhita: Attributed to the sage Sushruta, the Sushruta Samhita primarily focuses on the field of surgery. It is one of the earliest texts to provide detailed information on surgical techniques, instruments, and anatomy. Ashtanga Hridaya, Written by Vagbhata is a more concise and simplified compilation of the teachings found in the Charaka and Sushruta Samhitas

In Charaka Samhita, Pushkaramoola is given under *hikka nighranada* *saimani*, *swasaharada* *saimani*. Its also given in different formulations to treat a wide variety of ailments such as *jwara*, *swasa*, *kasa*, *rajyakshma*, *kushta* etc (Table 3). Sushruta in addition to the aforesaid indicated for *udavarta* and *vatavikara*. (Table 4). Vagbhata has mentioned many formulations with pushkaramoola as a key ingredient in *arsas*, *gulma*, *grahani*, *shopha*, *soola* etc (Table 5)

Table 3. :Pushkaramoola in Charaka Samhitha⁽⁶⁾

| Sl. No. | Preparation /Yoga | Indication | Reference |
|---------|--------------------------|-----------------------------------|--------------|
| 1. | HikkaNighrahana | Dasaimani | C Su. 4/30 |
| 2. | Swasahara | Dasaimani | C.Su. 4/37 |
| 3. | AgryaAusadha | Swasa, Kasa Parsvashoolahara | C.Su. 25/39 |
| 4. | Satyadi Varga | SannipatajaJwara | C.Su. 3/211 |
| 5. | Baladi Ghrita | Jwara | C.Ci. 3/225 |
| 6. | Agaruadi Taila | Jwara | C.Ci. 3/266 |
| 7. | Lodrasava | Kushta | C.Ci. 6/41 |
| 8. | DuralabadiGhrita | Jwara | C.Ci. 8/108 |
| 9. | JeevantyadiGhrita | Eakadasha Lakshana Rajayakshma | C.Ci. 8/111 |
| 10. | MarichyadiChoorna | Grahani | C.Ci. 15/109 |
| 11. | SatyadiChoorna | Swasa, Kasa | C.Ci. 17/123 |
| 12. | ChitrakadiLehya | Swasa,Kasa,Gulma,Hridya | C.Ci. 18/56 |
| 13. | Agastya Haritaki | VishamaJwara,Kasa,Swasa,Hikka | C.Ci. 18/58 |
| 14. | HinguugragandhadiChoorna | Pleeha,Udara,Ajeerna | C.Ci. 26/22 |
| 15. | KatphaladiKwatha | KaphajaHridroga | C.Ci. 26/97 |

Table 4: Pushkaramoola in Sushruta Samhitha⁽⁷⁾

| Sl. No. | Preparation /Yoga | Indication | Reference |
|---------|------------------------|------------------------------|-------------|
| 1. | HinguvadiChoorna | Vata Vikara | S.U. 5/28 |
| 2. | PushkaramooladiChoorna | Parsvashoola, Hridaya shoola | S.U. 42/120 |
| 3. | Agastyaavaleha | VishamaJwara, Swasa, Kasa | S.U. 52/43 |
| 4. | DevadarvadiKwatha | Udavarta | S.U. 55/45 |

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|----|-------------------|-------------------------|------------|
| 5, | PanchagavyaGhrita | ChaturthakaJwara, Swasa | S.U. 61/35 |
|----|-------------------|-------------------------|------------|

Table5 .Pushkaramoola in Ashtanga Hridaya⁽⁸⁾

| Sl. No. | Preparation /Yoga | Indication | Reference |
|---------|----------------------|----------------------------------|-------------------|
| 1. | NagaradiKashayam | SannipatikaJwara | Ah.Chi.1/65-69 |
| 2. | Yavanyadi Peya | Kasa Chikitsa | Ah.Chi. 3/20-21 |
| 3. | TwakadiLehya | Hridroga,Kasa | Ah.Chi. 3/32 |
| 4. | DipyakadiKashayam | Kaphaja Kasa | Ah.Chi. 3/54 |
| 5. | DasamuladiGhrita | Vatakaphaja Kasa | Ah.Chi. 3/56-57 |
| 6. | KantakariGhrita | Kasa,Swasa,Hikka | Ah.Chi. 3/59-63 |
| 7. | Agastya Rasayana | Kasa,Swasa,Hikka,VishamaJwara | Ah.Chi. 3/127-132 |
| 8. | ChavikadiGhrita | Kshayaja Kasa | Ah.Chi. 3/159-161 |
| 9. | TejovatyadiGhrita | Swasa,HidmaChikitsa | Ah.Chi. 4/52-55 |
| 10. | JivantyadiGhrita | Rajayakshma | Ah.Chi. 5/16-17 |
| 11. | SunthyadiGhrita | Chardi, Hridroga ,TrisnaChikitsa | Ah.Chi. 6/28-29 |
| 12. | Pushkaradi Kalka | VikartikaShoola | Ah.Chi. 6/31-33 |
| 13. | Pushkaradi Kashaya | KaphajaHridroga | Ah.Chi. 6/49-52 |
| 14. | PippalyadiAnuvasanam | Arsha Chikitsa | Ah.Chi. 8/89-93 |
| 15. | PutikaranjaCukra | Arsha,Panduroga,Udara,Gulma | Ah.Chi. 8/145-148 |
| 16. | DhanwantaraGhrita | PramehaChikitsa | Ah.Chi. 12/19-24 |
| 17. | Rodhrasava | PramehaChikitsa | Ah.Chi. 12/25-28 |
| 18. | HinguvadiGhrita | GulmaChikitsa | Ah.Chi. 14/9-10 |
| 19. | DadhikaGhrita | GulmaChikitsa | Ah.Chi. 14/13-21 |
| 20. | HingvadiChoorna | GulmaChikitsa | Ah.Chi. 14/31-32 |
| 21. | PushkaradiKashayam | GulmaChikitsa | Ah.Chi. 14/49 |
| 22. | Narayana Choorna | Udara Chikitsa | Ah.Chi. 15/14-21 |
| 23. | Ajaji Peya | SvayathuChikitsa | Ah.Chi. 17/20-21 |
| 24. | RasnadiGhrita | Vata VyadhiChikitsa | Ah.Chi. 21/57 |

In addition to the Brihatrayi (Great Triad) and the Laghutrayi (Smaller Triad) in Ayurveda, there are several other important Ayurvedic texts that provide valuable insights into various aspects of this traditional system of medicine. Some of these texts include: Bhela Samhita

,Harita Samhita,Chakradatta,Kashyapa Samhita have given various formulations with Pushkaramoola as a ingredient.

Table 6: Pushkaramoola inChakradatta⁽⁹⁾

| SI. No. | Preparation /Yoga | Indication | Reference |
|---------|----------------------------|----------------|------------------|
| 1. | Chaturbadravaleha | Jwara | CK.d. 1/102 |
| 2. | Nimbadi Kashaya | Jwara | CK.d. 1/97 |
| 3. | Pancha Tiktaka Kashaya | Jwara | CK.d. 1/123 |
| 4. | KshudradiKashayam | Jwara | CK.d. 1/132 |
| 5. | AshtangawaAvaleha | Jwara | CK.d. 1/149 |
| 6. | BharangyadiKwatha | Jwara | CK.d. 1/169 |
| 7. | Paushkaradi Kashaya | Kasa | CK.d. 11/18 |
| 8. | DasamoolaGhritam | Kasa | CK.d. 1/44 |
| 9. | SaptasatikaPrasaraniTailam | Vatavyadhi | CK.d. 22/188-204 |
| 10. | HingwadiChoorna | Shoola | CK.d. 25/50 |
| 11. | KankayanaGutika | Gulma | CK.d. 30/52-57 |
| 12. | PushkaramoolaChoorna | Hridroga | CK.d. 31/12 |
| 13. | HingwadiChoorna | Hridroga | CK.d. 31/17 |
| 14. | PadadiChoorna | Hridroga | CK.d. 31/19-21 |
| 15. | DhanwantaraGhrita | Prameha | CK.d. 35/28-35 |
| 16. | Narayana Choorna | Udara | CK.d. 37/31-38 |
| 17. | MaharohitaGhrita | Shopha | CK.d. 39/32-38 |
| 18. | Saindhawadi Taila | Vridhi,Bhaghna | CK.d. 40/25-28 |
| 19. | SaptavinshatiGuggulu | Bagandhara | CK.d. 46/13-18 |
| 20. | Trikatwadikwatha Nasyam | Siroroga | CK.d. 60/21 |
| 21. | SahacharadiKwatha | StreeRoga | CK.d. 63/38 |

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| 22 | PushkaradiChoorna | Balaroga Kasa | CK.d. 64/58 |
| 23 | KumarakalyanaGhrita | Sarvabalaamaya, Dantodbeda | Ck.d. 64/70-74 |
| 24 | Siva Gutika | Rasayana | CK.d. 65/161-173 |

Table 7: Pushkaramoola in Haritha Samhitha⁽¹⁰⁾

| Sl. No. | Preparation /Yoga | Indication | Reference |
|---------|--------------------------|---------------------------|-----------|
| 1 | Mulakadya Taila | Vata Vyadhi | Ha.Sa. 20 |
| 2 | Narayana Taila | Pangu,Vandhya,Sukrakshaya | Ha.Sa. 20 |
| 3 | RasnadiKwatha | Amavata | Ha.Sa. 20 |
| 4 | AjamodadiChoorna | Amavata | Ha.Sa. 20 |
| 5 | SatavaryadiChoorna | Grdhrasi | Ha.Sa. 21 |
| 6 | SatyadiChoorna | Gulma | Ha.Sa. 4 |
| 7 | AjamodadiChoorna | VatajaGulma | Ha.Sa. 4 |
| 8 | HingvadiChoorna | VatajaGulma | Ha.Sa. 4 |
| 9 | HinguSauvarcaladyaGhrita | VatajaGulma | Ha.Sa. 4 |
| 10 | KulatthadiKwatha | Prameha | Ha.Sa. 28 |
| 11 | CandanadiKwatha | Danta Roga | Ha.Sa. 46 |
| 12 | DevadarvadiGhrita | Sira Shoola | Ha.Sa. 7 |
| 13 | Katphaladi Yoga | Pinasa | Ha.Sa. 42 |
| 14 | DashangaKwatha | SannipatikaJwara | Ha.Sa. 2 |
| 15 | BrihatyadiKwatha | SannipatikaJwara | Ha.Sa. 2 |
| 16 | SatyadiKwatha | Jwara | Ha.Sa. 2 |
| 17 | Laghu RasnadiKwatha | Jwara | Ha.Sa. 2 |
| 18 | HingvadiKwatha | Shoola | Ha.Sa. 7 |
| 19 | TumburvadiChoorna | VatikaShoola | Ha.Sa. 7 |
| 20 | ChandanadiChoorna | Apasmara Unmada | Ha.Sa. 19 |
| 21 | Maha Pancha Gavya Ghrita | Apasmara Unmada | Ha.Sa. 19 |

Table 8 :Pushkaramoola in Bhela Samhitha⁽¹¹⁾

| Sl.No | Formulation | Indication | Reference |
|-------|-------------------|------------|----------------|
| 1. | DadhikaGhritam | Gulma | B.Chi. 5/20-28 |
| 2. | HaritakadiChoorna | Hridroga | B.Chi. 19/6 |

| | | | |
|----|----------------------|-----------------------------------|-----------------|
| 3. | PadadiChoorna | Hridroga | B.Chi. 19/7-9 |
| 4. | Agastya Rasayana | Kasa | B.Chi. 20/40 |
| 5. | YavanyadiChoorna | Amatisara | B.Chi. 10/16 |
| 6. | HinguvadiChoorna | Hridroga,Parsvashoola,Apatantraka | B.Chi. 26/12-13 |
| 7. | AswathamooladiModaka | Rajayakshma | B.Chi. 4/54-68 |

Table 9: Pushkaramoola in Sahasra Yogam ⁽¹²⁾

| SI No | Formulation | Indication |
|-------|--------------------------|---|
| 1. | BharangyadiKashayam | SannipatikaJwara,HridayaShoola,ParsvaShoola |
| 2. | NimbadiKashayam | KaphajaJwara |
| 3. | DashamooladiKashayam | Sirashoola,Kshayam,Kasa |
| 4. | AshwagandhadiKashayam | Kshayam |
| 5. | PushkarahwadiKashayam | Hridroga |
| 6. | PoushkaradiKashayam | Kasa,Swasa |
| 7. | DashamoolaKashayam | Swasa,Parsvashoola,HridayaShoola |
| 8. | KulanthadiKashayam | Hikka |
| 9. | KankayanaGutika | Rakta Gulma |
| 10. | Agasthyarasayana | Swasa,Kasa,VishamaJwara,Hrdroga,Grahani |
| 11. | JeevanyadiChoorna | Kasa,Swasa,Hikka |
| 12. | TegarajarasaChoorna | Kasa,Swasa |
| 13. | TrikatutriphaladiChoorna | Kasa,Swasa,Arsha,Bagandara,Gulma |
| 14. | PushkaramoolaChoorna | Hridroga,Kasa,Swasa,Hikka |
| 15. | BrhatgnimukhaChoorna | Ajeerna,Gulma,Pleeha,Arsha |
| 16. | SringhadiChoorna | Hikka,Kasa,Peenasa |
| 17. | Sudarshana Choorna | Jwara,Swasa,Kasa,Pandu,Hridroga,Kamala |
| 18. | HinguvadiChoorna | ParswaShoola,UdaraRoga,Vridhi |
| 19. | Chaturbadravalehika | Swasa,Jwara,Kasa |
| 20. | Chyavana Prasha | Hrdroga,Raktavata,Shukla Dosh |
| 21. | Dashamoolarishta | Kasa,Swasa,Vataroga,Kshayam,Pandu |
| 22. | Pushkaramoolasava | Kshayam,Apasmara,Kasa,Raktapitta |
| 23. | Haritakyasava | Shoola,Mutrakrichra,Asmari |
| 24. | Narayana Taila | Garbha Vikara,Vandya |
| 25. | TejovatyabhringaGhrita | Hikka,Swasa,Shopha,Vata,Arsas |
| 26. | DashamoolaGrita | Kasa,Swasa |
| 27. | DhanwantaraGhrita | Arsha,Kshayam,Pandu,Chardi |
| 28. | BaladyaGhrita | Jwara,Kshayam,KasaSirashoola |

| | | |
|----|------------------------|-----------------------------------|
| 29 | MahamayooraGhrita | Vandyata,SukraartavaRoga,YoniRoga |
| 30 | MahatpanchagavyaGhrita | Jwara,Apasmara,Gulma,Grihapeeda |
| 31 | SimhyamrtaGhrita | Arsha,Prameha |

Table 10: Pushkaramoola in Kashyapa Samhitha⁽¹³⁾

| SI.No | Formulation | Indication | Reference |
|-------|------------------------|------------------------|------------------------|
| 1. | SatyadiChoorna | KaphaVatajaJwara | Ks Khi. 19/44-45.1 |
| 2. | Vidangadi Kashaya | SannipatikaJwara | Ks Khi. 19/45.2-46.1 |
| 3. | Brihatyadi Kashaya | SannipatikaJwara | Ks Khi. 19/49.2-49.1 |
| 4. | Duralabadi Kashaya | SannipatikaJwara | Ks Khi. 19/46.2-48.1 |
| 5. | Brihatyadi Kashaya | KaphaVatajaJwara | Ks Khi. 19/20 |
| 6. | Dashamooladi Kashaya | Vata Jwara | Ks Khi. 19/18-19 |
| 7. | Jeevantiyadi Yoga | SannipatikaJwara | Ks Khi. 19/48.2-49.1 |
| 8. | KushtadiAnuvasana Yoga | Shoola | Ks Khi. 18/58-61 |
| 9. | PippalyadiChoorna | Shoola,Udavarta | Ks Khi. 18/55-57 |
| 10. | HingwadiChoorna | Shoola | Ks Khi. 18/18-21 |
| 11. | Devadaruadi Kashaya | Shopha | Ks Khi. 17/70.2-71.1 |
| 12. | Brihatyadi Kashaya | SutikaKaphajaJwara | Ks Khi. 11/128 |
| 13. | Dashamooladi Kashaya | SutikaSannipatikaJwara | Ks Khi. 11/161.2-165.1 |
| 14. | Pancakolaka Yusa | Sangrahika,Deepaniya | Ks Khi. 4/402-42.1 |
| 15. | SatyadiChoorna | Shoola Anaha | Ks Ka. 8/114.2-115 |
| 16. | Pippalyadi Vati | Vata Gulma | Ks Chi. 8/32-35 |
| 17. | KatukaSarpi | SannipatikaJwara | Ks Ka. 8/144.1 |

3.2 PROPERTY OF PUSHKARAMOOLA INVARIOUS NIGHANTUS

Table 11: Pushkaramoola in Various Nighantus

| SI No | Nighantu | Indication | Reference |
|-------|--------------------------------------|--------------------------|------------------|
| 1. | Dhanvantari Nighantu ⁽¹⁴⁾ | JwaraArocaka | Guduchyadi Varga |
| 2. | Madanapala Nighantu ⁽¹⁵⁾ | VatakaphaJwara | |
| 3. | Kaiyadeva Nighantu ⁽¹⁶⁾ | Jwara,Shopha,Aruci,Swasa | Ausadi Varga |
| 4. | Raj Nighantu ⁽¹⁷⁾ | Kapha Vata Jwara | Pippalyadi Varga |

| | | | |
|----|--|--|--------------------|
| 5. | Bhavaprakasha Nighantu ⁽¹⁸⁾ | Kapha Vata Jwara | Haritakyadi Varga |
| 6. | Priya Nighantu ⁽¹⁹⁾ | Madavaham | Satapushpadi Varga |
| 7. | Sodhala Nighantu ⁽²⁰⁾ | Parshva Ruka, Swasa, Kasa, Hikka, Jwara | |

3.3 DESCRIPTION OF PUSHKARAMOOLA IN VARIOUS BOOKS.

1. AYURVEDIC PHARMACOPOEIA OF INDIA⁽²¹⁾

Pushkaramoola is mentioned in The Ayurvedic Pharmacopoeia of India Part-I & Volume IV.

Table 12: Identity, Purity and Strength

| | |
|----------------------------|----------------------------|
| Foreign matter - | Not more than 2 percent |
| Total ash | Not more than 5 per cent. |
| Acid-insoluble ash | Not more than 0.6 per cent |
| Alcohol-soluble extractive | Not less than 10 percent |
| Water-soluble extractive | Not less than 20 per cent |

T.L.C

T.L.C of alcoholic extract on Silica gel 'G' plate shows nine spots at Rf. 0.23, 0.28, 0.34, 0.39, 0.48, 0.51, 0.64, 0.73 and 0.94 (all yellow) on exposure to Iodine vapour using Benzene: Ethylacetate.

At Rf. 0.11, 0.28, 0.34, 0.39, 0.48, 0.64, 0.73 and 0.94 (all violet) on spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C eight spots appear .

2. THE WEALTH OF INDIA⁽²²⁾

In Ayurvedic system of medicine,

- The roots were given in cough, dyspnoea, asthma, pleurisy, tuberculosis and chest pain, especially in precordial pain.

- The aqueous extract of dry or fresh roots is given orally in rheumatic pains and liver problems and it's used for external application for relieving pain.
- Anti-anginal, Hypolipidaemic properties were seen in the roots (powder)
- Pushkara-guggulu, which has been found effective in management of ischemic and coronary heart disease; the treatment with the drug has beneficial effect in restoration of normal ECG, and significant reduction in cholesterol, triglycerides and total lipid levels. .
- The essential oil obtained from roots exhibits Antibacterial activity against several Gram positive and Gram negative bacteria.

3.QUALITY STANDARDS OF INDIAN MEDICINAL PLANTS⁽²³⁾

Chemical Constituents

Foreign organic matter: Not more than 1.0 per cent. Ash: Not more than 4.8 per cent. Acid insoluble ash: Not more than 0.57 per cent. Ethanol-soluble extractive: Not less than 25 per cent. Water soluble extractive: Not less than 15.0 per cent.

Adulterants/Substitutes

The roots of *Saussurealappa* C. B. Clarke (Asteraceae), *Iris germanica* Linn. (Iridaceae) and *fuldroyleana* DC. are used as substitutes of *I. racemosa*

Pharmacology

- Administration of the *I. racemosa* root extract decreased the serum glucose level in dexamethasone induced hyperglycaemic mice and plasma glucose and insulin levels in adrenaline induced hyperglycaemia in rats.
- The alcoholic extract of root lowered blood glucose and enhanced liver glycogen without increasing plasma insulin in rats, suggesting that the actions might be at the peripheral level by potentiating the insulin sensitivity.
- The root powder also showed negative inotropic and chronotropic effects on frog heart, indicating that one of the constituents may have adrenergic beta-blocking activity.
- A human study showed the beneficial effect of root extract in cases of angina pectoris. The alcoholic extract of root exhibited antiallergic activity in rats it also showed marked protection against the bronchospasm in guinea pigs, which has been attributed anti-5-HT, antiallergic and antihistaminic properties.

- Alantolactone isolated from the root showed anti-inflammatory and hepatoprotective activities in albino rats.
- Alantolactone and isolantolactone exhibited anti dermatophytic activity against ringworm fungi while latter was also active against other human pathogenic fungi. The essential oil of root exhibited antifungal and antibacterial activity against gram-positive and gram-negative bacteria.

Major Therapeutic Claims

Antihyperglycemic, Antiasthmatic, Antidyspnoea.

Safety Aspects

The drug used traditionally in prescribed doses may be considered safe

Dosage

Powder: 1 to 3 Grams

4.ENCYCLOPAEDIA OF WORLD MEDICINAL PLANTS⁽²⁴⁾

Erect herb, up to 1.8m tall, young parts densely hairy. Leaves elliptic-lanceolate or obovate, amplexicaul. Flowers in heads, yellow. Fruit achene.



Figure 1: Plant Pushkaramoola (*Inula racemosa*Hook.f.)

It is a Erect herb, up to 1.8m tall, young parts densely hairy and the Leaves are elliptic-lanceolate or obovate, amplexicaul. The Flowers in heads are yellow and the Fruit is achene.



Figure 2: Dried root of Pushkaramoola (*Inula racemosa* Hook.f.)

Flowering & Fruiting time : July-September.

Medicinal uses:

- It is used as an expectorant and resolvent.
- Roots contain Inuline (10%) and an essential oil containing alantolactone which is strongly anthelmintic, expectorant and diuretic.
- Seeds are aphrodisiac.
- It is also a good cure for rheumatism. Roots show hepatoprotective activity

12. DESCRIPTION OF PUSHKARAMOOLA IN DIFFERENT JOURNAL

Table 13: Pushkaramoola in Different Journal

| Sl.No | Part used | Pharmacological Activity/ Clinical Activity | Model or Method | Solvent used | Reference |
|-------|-----------|---|-----------------|---|---|
| 1. | Root | Cardio protective Activity | Rats | Petroleum extract | Chabukswar.et.al. 2010 ⁽²⁵⁾ . |
| 2. | Root | Antiallergic Activity | Albino rats | Alcohol | Srivastava, S., Gupta, PP.et.al. (1999) ⁽²⁶⁾ |
| 3. | Root | Cytotoxic Activity | In vitro | n-hexane, chloroform, n-butanol and aqueous | Gnanasekaran, D.; et.al, 2012 ⁽²⁷⁾ . |
| 4. | Root | Antimutagenic & Antiapoptotic Effects | Mice | Aqueous | Arumugam, P. and Murugan, M (2013) ⁽²⁸⁾ . |

| | | | | | |
|-----|------|--|-----------------|------------------------|---|
| 5. | Root | Hepatoprotective Activity | Rats | Hydroalcoholic extract | Rao K, Mishra S. 1997 ⁽²⁹⁾ . |
| 6. | Root | Hypoglycemic Activity | Rats | Ethanol | S. Gholap, A. Kar, (2003) ⁽³⁰⁾ . |
| 7. | Root | Anti-inflammatory & Analgesic Activity | Mice | Aqueous | Arumugam, P., Marudhamuthu.et.al (2013) ⁽³¹⁾ . |
| 8. | Root | Antifungal Activity | Human | Methanol | R.X. Tan et.al ⁽³²⁾ |
| 9. | Root | Adrenergic Beta Blocking Activity | Albino rat/frog | Petroleum ether | Tripathi YB et.al (1988) ⁽³³⁾ . |
| 10. | Root | Antioxidant Activity | Albino rat | Ethanol extract | S. Srivastava, B. Anand, B. Ali, (2012) ⁽³⁴⁾ . |
| 11. | Root | Antibacterial Activity | Agar plate | Ethanol and Aqueous | Y.Q. Yang, H.L. Ma, Z.X. Zhang, (2009) ⁽³⁵⁾ . |
| 12. | Root | Mosquito Larvicidal Activity | | Ethanol | H.E. Qing et.al. (2014) ⁽³⁶⁾ . |
| 13. | Root | Adaptogenic Activity | Albino rat | Ethanol roots | D. Gnanasekaran et.al, (2012) ⁽³⁷⁾ . |
| 14. | Root | Antiasthmatic Activity | Mice | Petroleum ether | Vadnere, G. P et.al. (2009) ⁽³⁸⁾ . |

3.DISCUSSION

Ayurveda is an ancient practise of medicine, utilising the various knowledge of the medicinal plants available in Indian subcontinent. A great percent of ayurvedic preparation is based on medicinal plants. The ayurvedic literature documentation can be catageriosed in 4 different periods the vedic period, the Samhita period, the medieval period and the modern period .The medicinal plants documentation find a place in three of four Vedas. Samhitas describe different plants and its medicinal uses. The texts have description and therapeutical uses of medicine. We also have to mention Nigantus which are written based on the medicinal plants mentioned in samhitas. Among thousands of medicinal plants mentioned in ayurvedic literature, here we are codifying one of the medicinal plantpushkaramoola (Inula racemose Hook.F) mentioning in various ayurvedic literature.

The plant is pushkaramoola is a medicinal plant which grows in India, China, Nepal, Afganistan .Pushkaramoola has wide range of pharmacological actions such Antipyretic, Antiinflammatory, Heapatoprotective ,Anthelintic,Antiasthmatic and Antifungal properties. The root of the plant is mainly used for various medicinal purpose. Roots are bitter, acrid, thermogenic, cardi tonic ,expectorant, alexipharmic, anodyne, antiinflammatory, digestive, carminative, aphrodisiac. The root has been traditionally used for the treatment of gonorrhoea; the flower is used in jaundice and ophthalmic afflictions in folklore. Leaves are extensively used for the affections of the respiratory tract such as chronic and acute bronchitis. The dried leaves are smoked as cigarettes in asthma and the juice of fresh leaves have been used for diarrhoea and dysentery and also used as valuable antiseptic, antiperiodic and anthelmintic

Pushkaramoola is a drug that is widely used in the classic text books to treat different vyadhis. It is considered as Agrayaousadha in swasakasaparswasoola hara rogas. A through study was done throughout the ayurvedic text books which shows that pushkaramoola is mostly administered as single drug or as compound preparation in Swasa (antiasthmatic) ,Kasa (cough), Jwara (antipyretic), Rajyakshma (tuberculosis) ,Gulma,Udara,Udavarta(G.I.T problems), Hrdroga(Cardiac protective),Hikka (hiccup), Ajeerna (Indigestion) , Amavata,Vatavikara (Vitiation of vata) ,Soola (pain reliever), Chardi (emesis) , Kushta (skin diseases), Arsas (piles), Bagandara (fistula), Sopha (anti-inflammatory), Pandu (Anemia) , Kamala(jaundice) ,Apsmara((convulsions),Mutrakrichra (urinary diseases),Asmari (Anti-urolithiasis) ,Vandya (Aphrodisiac),Prameha (Anti-diabetic), Danta roga, Sirasoola , Pinasa (catarrh), Rasayana (rejuvenator).The Cardio protective,anti allergic, cytotoxic, antimutagenic, antiapoptotic, hepatoprotective, hypoglycemic,anti inflammatory, analgesics ,antifungal, adrenergic ,beta blocking activity, antioxidant ,antibacterial ,mosquito larvicidal activity, adaptogenic activity and antiasthmatic activity were studied already .Still some of the properties which are indicated in the classical textbook need to be explored especially the antipyretic.

Jwara is a prevalent problem in today's general practice, affecting both sexes at various stages of their life. Even in the Vedas, *Jwara* is mentioned. It is regarded as the earliest manifestation of an illness. *Jwara* was given a lot of focus by Acharya Charaka, who kept it ahead of all other diseases. *Jwara* is an illness that is quite common and is comparable to pyrexia. A wide range of modern drugs are used to treat inflammation and pyrexia, but their long-term use may have several harmful side effects. As a result, new anti-inflammatory drugs and anti-pyretic derived from plants must be established, and existing therapies must be utilized more effectively. Herbal antipyretic drugs are derived from plant sources and are often considered a more natural and holistic approach to managing fever. Many herbal antipyretic drugs have a long history of traditional use, which suggests their safety profile. They often have fewer side effects compared to synthetic drugs, making them suitable for a wide range of individuals, including those with allergies or sensitivities. Some herbal antipyretics possess antimicrobial properties, which can be beneficial when fever is caused by infections. These herbs can help address the underlying cause of fever while reducing the body's temperature. They can aid the body's natural defense mechanisms in fighting off infections. In an era where concerns about antibiotic resistance and overuse of pharmaceutical drugs exist, herbal antipyretics offer an alternative that can reduce the reliance on synthetic medications.

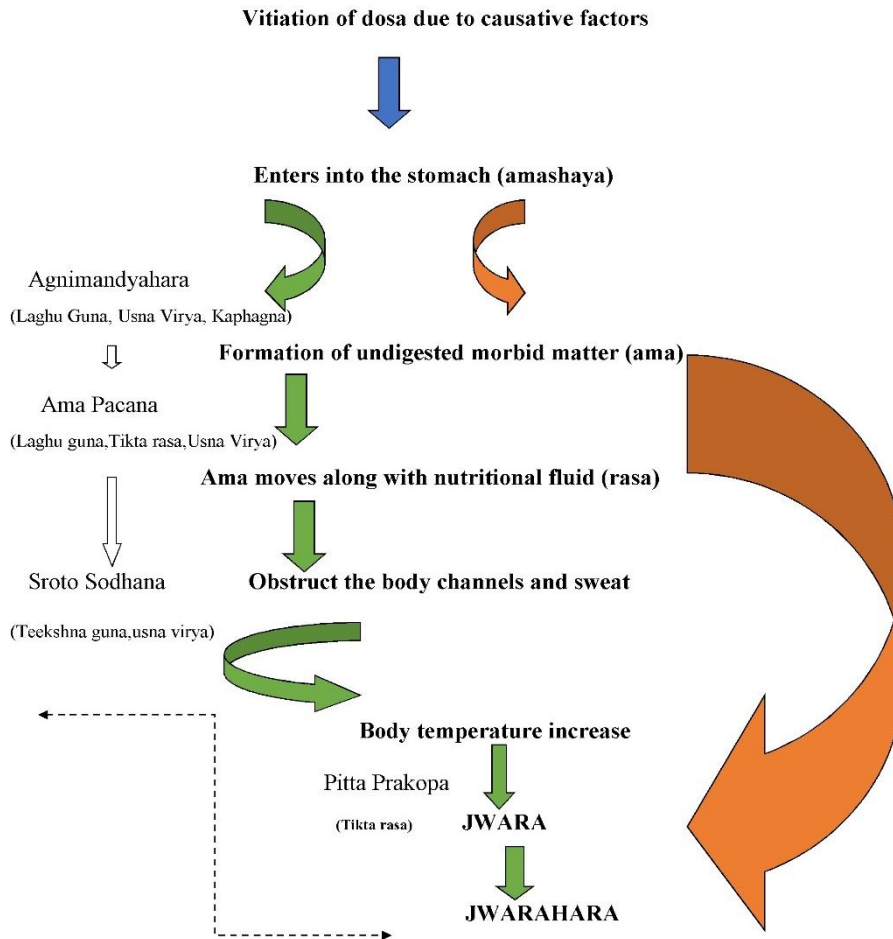
Pushkarmoola can be used as a single antipyretic herbal drug and as a formulation in different kind of jwara. The mostly used jwarahara formulations with pushkarmoola as a key ingredient in different samhithas include Baladi ghritha, Agaraditaila, Duralabhadighrita, Agastyaavaleha, Panchagavyaghritha, Nagaradikashayam, chaturbadravaleha, NimbadiKashaya, PanchatiktakaKashayakshudradiKashaya, Ashtangawaavaleha, Bharangyadikwatha, Satyadi kwatha, Laghu rasnadikwatha, Sudarshanachoorana, satyadichoorana, Vidangadi Kashaya, BrhatyadiKashaya, DuralabhadiKashaya, DashamooladiKashaya, Jeevantiyadiyoga, Katukasarpi.

as *rasa* (taste), *guna* (attribute/quality), *virya* (potency/energy), *vipaka* (biotransformation), and *prabhava* (principle responsible for specific activity). The probable action of the pushkarmoola as a jwarahara can be due to its (Flow chart No 1)

- Tikta Rasa – reduces *pitta*, relieves *daha* and *pippasa* and helps in *ama Pacana*, increases the appetite reduces *Trishna* and act as *vishaghna*
- Laghu guna – *ama pachana*, *kapha hara*, helps in *langana* which is the prime treatment of *jwara*
- Ushna Virya- helps in *ama pacana*, *kaphahara*, *srotosodhaka*
- Teekshnaguna- *srotosodhaka*, *kaphahara*
- Katu Vipaka- *srotosodhaka*, *kapha hara*
- Kaphaghna Karma - *Ama pachana*

Ayurvedic treatment is widely acknowledged for its high effectiveness. However, there remains a significant gap in understanding the mode of action, pharmacology, pharmacokinetics, and pharmacovigilance of many essential Ayurvedic drugs. Additionally, the comprehensive knowledge of the fundamental principles of Ayurveda faces challenges in gaining scientific acceptance due to the lack of robust evidence. So, more research and clinical studies are needed to validate the efficacy and safety of Pushkarmoola as an antipyretic drug

SampraptiVighatana of the Jwara by Rasa PanchakaPushkarmoola



4. CONCLUSION

It is notable that although Pushkarmoola's antipyretic potential is well-described in ancient texts like the Samhitha, there is a surprising absence of relevant studies to validate these claims. This gap creates a significant opportunity for further exploration into Pushkarmoola's effectiveness as an antipyretic, especially in individuals with cardiac conditions and respiratory ailments. In an era where the demand for effective antipyretic drugs without adverse side effects is crucial, the need for extensive research on Pushkarmoola as an antipyretic cannot be overstated.

This research could pave the way for its recognition as a prominent and safe antipyretic medication, offering potential benefits to a wide range of patients.

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ABBREVIATION