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LITERARY REVIEW OF KALAMEGHA (ANDROGRAPHIS PANNICULATA)WSR INDIAN AND SRI LANKAN LITERATURE

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ABSTRACT

Acharyas of Ayurveda scientifically categorised various drugs under the topic of Ganas and Vargas based on guna karma and therapeutic uses. The classical text is an authentic source for drug identification, therapeutic activities and substitutes. *Kalamegha* is one such drug botanically identified as *Andrographis panniculata,* distributed in the plain regions of the Indian subcontinent. This plant is widely used in Ayurveda, Siddha, homoeopathic, and Sri Lanka's traditional medicine systems. It is indicated in *Kushta, kandu, Shopa, yakrith roga , krimi* and *jwara.* A*ndrographoloids* and N*eo andrographoloids* are the active principles that prevent oxidative damage and inhibit the binding of toxic metabolites to DNA. Hence used for treating anti-inflammatory, hepatoprotective, anti-bacterial, anti-viral, antioxidant, anti-parasitic, anti-diarrheal and several infectious diseases ranging from malaria to dysentery. The study aims to explore the review literature of Kalamegha from all the medical classical texts and journals of Indian and Sri Lankan origin. And present a summary of the available records. According to references, in different geographical regions, Kalamegha is termed as Bhunimba, bunimo, kiratha thikta, desh kiratha, bin Kohomba, etc., having *tikta rasa, laghu ruksha guna, ushna veerya, katu vipaka* and k*apha pitta hara, deepana* and *pachana* properties. Literary review plays a vital role as it aids in the identification of the drugs and therapeutic utilities of outspread drugs in different geographic regions. Since the Kalamegh plant is widely distributed in In-

dia and Sri Lanka, an attempt was made to record the uniformity and diversities of the morphological and therapeutic utilities of the Kalmegha.

Keywords: *Kalamegha, Andrographis paniculata, A*nti-inflammatory

INTRODUCTION

Kalamegha or *Kalmegh* (Andrographis paniculata) an herbaceous annual is much esteemed medicinal plant in Ayurveda. It was used for centuries in place of as an alternative to antibiotics before hardcore antibiotics were evolved. It has been used primarily to treat cold, liver & skin diseases, lack of appetite, fever and purification of the blood. The plant is bitter in taste and is used to stimulate liver function, reduce inflammation, and treat worm infestations. It is one of the prominent ingredients in 28 different poly herbal patent formulations in vogue in Ayurveda system of medicine.

It has been used in India, Sri Lanka, China, Thailand, SouthEast Asia and other Asian countries. Andrographis paniculata (powder and extract) is official in Indian Pharmacopoeia as *kalmegh* in 2007 and in 2014 edition and categorized as hepatoprotective agent.It is commonly known as *"Nilavembu"* in Tamil and *Heen bin kohomba* in Sinhala.

Kaalamegha quite a name to live up to, literally it means "black cloud" or "dark cloud"perhaps attesting to its harvest time just before winter or flowering time from September to December. The plant is known in north-eastern India as *Mahaa-tikta* which literally means king of bitters. Its another epithet is *'Bhoo-Nimba'* or *'Bhui-Neem'* where *bhoo* stands for earth or ground and *nimb* or *neem* refers to Neem tree (Azadirachta indica). The term therefore means 'Neem of the earth' or 'Neem of the ground' referring to its neem like bitter taste and effects.

CHRONOLOGICAL LITERARY REVIEW

INDIAN LITERATURE

Vedakala: References are not available in the Vedic period.

Samhita Kala: References are not directly available in Brihatrayi's and Laghutrayi's

Nighantu kala: Nigantu adarsha - The word Kalamegha has been mentioned under the heading Vasaadivarga. Its properties, actions and rogaghnata are also mentioned. The source plant is Andrographis paniculata Nees[1].

Priya nighantu: Here, the word Kalamegha has been mentioned under the heading synonyms Shatapushpadivarga, like Bhunimba and Yavaakaraphala, and properties, actions and rogaghnata are also mentioned. The source plant is Andrographis paniculata Nees[2].

In the text Glossary of Vegetable Drugs in Brihatrayı, it has been noted that Andrographis paniculata Nees is popularly known as Bhunimba in Madhya Pradesh. In the Nagpur area and Bihar, forests are known as Chirayita.

SRI LANKAN LITERATURE

In Sri Lanka, Andrographis paniculata Neer is popularly known as Heen bin kohomba[3].

In the book named Osuthuru Visithuru, which includes about Sri Lankan traditional medicinal plants, it noted that Andrographis paniculate as wal binkohomba[4].

In the text about medicinal plants used in Sri Lanka, it has been mentioned that Andrographis panniculata is heen bin kohomba and nila vembu3.

DRUG REVIEW

NIRUKTI:

Kalamegha is derived from "Vangeeya Sampradaya"(Bengali vernacular nomenclature). It appears like a black cloud in the blue sky from a distance. Hence, it is called Kalamegha[5].

PARIBHASHA:

"Kalamegha kalameghah"

Kala - kal dhathu "ghajn" prathya shabdarthakausthuma [6] : Shiva, Godess, Black .

Megha - Mehathi mih (schane) dhathu "ach" prathya shabdarthakausthuma [6]

Cloud - "Appears like black cloud in the blue sky".
"Bhunimba bhuvah nimbah iva" -
Bhuva - Bhu (satthyam) dhathu kva prathya shabdartha6: That which is existing/ grown in the Earth.
Nimbha - nivi (sechane) dhathu "ach" prathya shabdam6: It is a small, bitter herb like Nimba/neem of the ground.
Kalpanatha - From which many formulations can be made.
Thiktha - thejayathi - thij (nishane) + nich dhathu "kth" prathya shabdarthakausthuma6: All the parts of the plant are bitter/Bitter.
Yavakara palah yava - yothiyu (mishrane) "ach" prathya shabdarthakausthuma6
Yavadhanya - Fruits are like indrayava or yavas.

VERNACULAR NAMES[7]:

Deccan:Charayetah, Kalaphnath
English: King of Bitters
Gujarati:Kariyatu, Kiryata, Kiriyati, Olikiriyat.
Hasada: Kalameg
Hindi :Charayetah, Kiryat, Mahatika
Kannada:NelaBevu
Malayalam:Kiriyattu, Nalaveppu
Marathi:Olenkirayat.
Oriya: Bhunimba
Persian: Nainchavandi,Sadani
Sanskrit:Bhuinim.Bhunimba, Kirata.
Sinhalese:Hinbinkobomba, Nin binkohomba.
Tamil : Nelavembu, Shiratkuchi.
Telagu: Nelave

Table No. 1 **SYNONYMS ACCORDING TO ACHARYAS**

SYNONYMS	D.G.H[8]	P.N[2]
Bhunimba	-	+
Kalamegha	+	+
Kalpanatha	+	+
Tikta	-	-
Yavakaraphala	-	+
Yavatikta	+	-

Table No. 2 **GANA/VARGA:**

Nighantu's	**Varga**	**Name**
AdarshaNighantu	Vasadivarga	Kalamegha
PriyaNighantu	Shatapushpadivarga	Kalamegha/Bhunimbha

RASA PANCHAKA AND ROGAGHNATA:

INDIAN LITERATURE[2]

It has tikta rasa, laghu ruksha guna, usna veerya, katu vipaka and kaphapitta hara, deepana and pachana properties. It is indicated in Jwara, Krimi, Kushta and Yakutroga[2]

SRI LANKAN LITERATURE

Rasa panchaka mentioned the same as Indian Literature; when it comes to the roghagnatha, Sri Lankan literature noted that according to the "vyuha".
Osuthuru visithuru[4]
Anna pachana vyuha:deepana and pachana,Yakututtejaka,Pittasaraka,krimighna
Raktha sanvahana: raktha shodaka, Shotha hara
Thvachaya: Swedajanaka, Kushtagna
Thapakramaya: Jwaraghna,Niyathakalina Jwaraprathibandhaka
Sathmikarana: Katu paushtika,tikta balakaraka
Prayoga: Kapha pittha vikara vishaya
Medicinal plants use in Sri Lanka[3]
They treat general debility, dysentery, and certain forms of dyspepsia.
Roots and leaves: Febrifuge, stomachic, tonic, alterative, Antihelmintic

PRAYOJYA ANGA:Panchangas[8]

Table No. 3 MATRA[9]:

DOSAGE FORM	DOSE
Churna	1-3 gms
Swarasa	5-10 ml
Kwatha	20-40 ml

Table No. 4 VISHISTHA YOGAS:

Sl no	Yogas	Indication	Reference
1	Bhunimbadi Churna	Kamala, Jwara, Pandu, Atisara	C.Chi.15/132133 Grahanidoshachikitsaadhyaya
2	MahaTiktakaghrita	Kusta,Visamajwara,Raktapitia, Hridroga	Su Chi 9/8 Kusta chikitsa
3.	Tiktakaghrita	Trushna, Bhrama, Daha, Pandu	AshtangaHridaya ChikitsaStaana 19/2-7, AF1"
4.	Rodrasava	Aruchi,Kruimi,Kushta,Grahani, Meha, Pandu	AshtangaHridayaChikitsaSthaana 12/24-2712, AFI"
5.	Chandraprabhavati	Anaha, Shoola, Kushta, Kandu, Kamala, Bhagandara	SharangadharaMadhyamaKhanda 7/40-49, AF1
6.	Dhanvantaragutika	Kasa,Shwasa, Rajayakshma,Kaphaprascka	Sahasra yogaGutikaprakarana 56, AF1
7.	Manasamitravati	Manodosha, Unmada, Apasmara, Vakdosha	Sahasra yogaGutika prakarana 68, AFI

BOTANICAL DESCRIPTION

Family: ACANTHACEAE

Botanical name: *Andrographis paniculataNees*.




MORPHOLOGY OF KALAMEGHA[7,10]

Habit: An erect or procumbent herbs, branched annual herb 0.3 to 0.9m. high, branches sharply quadrangular.

Leaves: 5 to 7.5cm by 1,2 to 2.5cm, lanceolate, acute, glabrous, slightly undulate or entire, pale beneath, base tapering, primary nerves 4-6 pairs, slender, petioles 0 to 6mm long

Inflorescence: Panicles

Flowers: Small, solitary, distant, in lax spreading axillary and terminal racemes or panicles, the whole forming large pyramidal paniculate inflorescence, bracts 2.5mm long, lanceolate, bracteoles similar, pedicels 0.8 to 4mm. long, glandular pubescent.

Calyx: 3mm. Long sepals equal 5 in number, linear-lanceolate, glandular-pubescent.

Corolla: The corolla is small, usually pale but blotched and spotted with brown and purple tubular at the base, the more or less ventricose, prominently 2- 2-lipped, the upper slightly flexed, the lower usually deflexed, 3-lobed and coloured. The lobes are 2.5mm. Long, linear, oblong, sub-obtuse tube 5mm. Long, slightly enlarged below the limb upper lip 4mm. Long, oblong, two-toothed at the apex, lower lip equal in length.

Fruit and seeds: Capsules 20 by 3mm. Linear-oblong, acute at both ends. Fruit is an oblong or elliptic capsule compressed at right angles to the septum,

four 12-seed, and the retinacula is acute or round—numerous, subquadrate, osseous rugosely pitted, glabrous, yellowish brown.

CHEMICAL COMPOSITION[11]:

Major - 0.5 to 0.9% andrographolide, a diterpene lactone.

Minor - Includes diterpene lactones such as andrographanin, deoxyoxoandrographolide. Glycosides such as neoandrographolide and andrographolide. Flavonoids such as pyroxylin, wogonin, and andrographolides A, B, C, D, E and F

PRAYOGA:

1. The expressed juice of the leaves, together with certain spices, such as Cardamoms, cloves, cinnamon, etc., is dried under the sun and made into little globules, which are prescribed for infants to relieve griping irregular stools and loss of appetite, flatulence, and diarrhea[12.]
2. A decoction of the plant is a blood purifier. It is used as a cure for torpidity of the Liver and for jaundice, neuralgia and constipation.
3. Switradilepa is effective in treating vitiligo[13.]
4. A decoction or infusion of the leaves is helpful in general debility and dyspepsia.
5. The leaves and roots are also used as febrifuge, stomachic, and cholagogue.
6. The tincture of the root is stimulant and aperients.
7. The decoction of the plant is used in high blood pressure and anaemia.
8. The hot water extracts of leaf stems are used as a powerful tonic.

INDIAN FOLK USES:

1. It forms the principal ingredient of a household medicine called Alvi use, which is extensively used in Bengal[7,12]
2. A paste of its dried roots with haridra in equal proportions is made with water, which is applied for itching and skin rashes.
3. Its leaves are used in great flatulence by the Nat and Musher people in Uttar Pradesh (Ahmed).
4. In central India, half a cup of plant decoction is taken in the morning and evening for 7-8 days to cure malaria.
5. The juice extracted from its leaves is mixed with coconut water and given orally in Kerala, also for worms (Augustin and Shivadasan).
6. According to Barthakuret. et al, 2004, in Assam. People take a decoction of its shoots in about ten gms quantity twice daily for 4-5 days in acute jaundice due to hepatitis associated with hepatomegaly. For children, honey or sugar is added to mask the bitter taste of the recipe.

SRI LANKAN FOLK USES

1. Keshara yoga choorna is used for pilika (Cancer)
2. Heen bin kohomba, Pavatta (Vasa), Nika mula (roots of nirgundi) decoction with Seetharam vati for fever
3. Heen bin kohomba, koththamalli (Dhanyaka), pathpadagam (parpata) decoction or boiled water for hikka
4. Heen bin kohomba sahamula (whole plant) boiled water for hepatitis
5. Heen bin kohomba, Madan pothu (jambu bark), ulu hal (methi)decoction for madhu meha
6. Iramusu (sariva), sudu hadun (chandan), Heen bin kohomba decoction for asathmika raktha dosha (blood infections)

SUBSTITUTES and ADULTERANTS[11] Andrographispaniculata is often substituted for or mixed with the genuine Swertia chirayita but can be distinguished easily by the green colour of its stem, numerous erect, slender, opposite branches and its lanceolate green leaves. Andrographispaniculatais is adulterated with Andrographisechioides Nees, found in tropical India and the dry districts of Maharashtra, Rajasthan, and Tamil Nadu. Andrographisechioides is devoid of andrographolide, the principal bioactive constituent of Andrographispaniculata. According to Dravyaguna, Hasthamalaka panchangas of Pittapa Papad (Fumariaindica; Family: Fumariaceae) & Kaka jangha (Peristrophebicalyculata; Family: Acanthaceae) are degraded to Andrographispaniculata.

CONTROVERSIAL ASPECTS[14]

1. In Samhita Kala, the terms yavatikta and Shankini were mentioned.

2. Dalhana comments on yavatikta and states it is a plant growing in barley fields/ yava Pradesh. It consists of 7 or 8 leaves, which are bitter and are called Yavantika.
3. Dridabala points out that Yavatikta and Shankhini differ because their therapeutic values differ.
4. The word saptalika in Sushruta samhita is mentioned but the commentator has opined saptalika as yavatikta.
5. According to all Nighantus like Nighantu Ratnakar, Dhanvantari Nighantu, Raja Nighantu, Shaligrama Nighantu, the term commonly accepted as yavatikta and recent Nighantus like Nighantu Adharsha, Priya Nighantu accepted as a Kalamegha and Bhunimbha.
6. According to Bapalal Vaidya, while explaining the controversy of Kalamegha, the green variety, like Chirayata, was found in Gujarat and is known as Kalamegha[1].
7. Bhunimba is accepted as a synonym of Kiratatikta (chirality - Swertia species), and Andrographis paniculata, which is sold in the market as its substitute or adulterant or by the name of Deshi-chirality and Kalamegha also. A. paniculata is locally known as Bhunimba in Madhya Pradesh and bhunimo in Orissa.
8. In high Himalayan regions, Kiratatikta is Swertia chirayita; here, other bitter species of Swertia are also used as Kiratatikta, but commonly called Deshi chirayita is Kalmegha.

RESEARCH PROFILE:

Toxicology[15]

1. Leaves and stem extracts may cause gastric discomfort, vomiting and loss of appetite when given orally in large doses.
2. Injection of the crude drug (extract of leaves and stem) extract may lead to anaphylactic shock.
3. Andrographolide showed reproductive toxic effects in male albino rats.
4. Leaves, when fed to male albino rats, andrographolide present in them cause the arrest of spermatogenesis by preventing cytokinesis of the dividing spermatogenic cell lines.

Pharmacological Uses[16,17]:

a. Antihelmentheticactivity
b. Antidiarrhoealactivity:
c. c. Antimalarial activity
d. Antiviral activity:
e. Antipyretic activity
f. Antiatherosclerotic activity:
g. Cardiovascular activity.
h. Hypotensive activity
i. Immunomodulatoractivity
j. Antifertility activity:
k. Hepatoprotective activity.

Clinical studies:

1. HIV[15]: Andrographolide has been suggested to inhibit HIV-induced cell cycle dysregulation, leading to a rise in CD4 (+) lymphocyte levels in HIV-1 infected individuals

DISCUSSION

Andrographis paniculata is locally known as *Bhunimba* in Madhya Pradesh and *bhunimo* in Orissa. In high himalayan regions so called *kiratatikta* (*Swertia chirayita*);here other bitter species of swertia are also used as *Kiratatikta*,but commonly called as *Deshi chirayita*.

According to Sri Lankan literature Andrographis paniculata is identified as "*heen bin kohomba*" which is the vernecular of Andrographis paniculata. The books named *Osuthuru visithuru* and Medicinal plants use in Sri Lanka also identify as *Tiktha , Kalamegha* and *Wal bin kohomba*

Kalamegha is one of the important ingredient of the formulations like *Bhunimbadi churna, Mahatiktaka ghrita, Chandraprabha vati, Dhanvantara gutika* and *Manasamitra vati* etc. It is attributed with *Tikta rasa*, and *Katu vipaka* which substantiates its indication in *Kushta, Kandu, Yakratroga, Krimi, Jwara.*The potency of the drug plays an important role in achieving the therapeutic efficacy.

CONCLUSION

In classical text of India Andrographis paniculata is identified as *yavatikta* . In different geographical re-

gion Andrographis paniculata is termed as *Bhunimba, Kiratatikta, Bhunimo, Desi chirayita* etc .

In classical text of Sri Lanka Andrographis paniculata is identified as *heen bin kohomba* and *wal bin kohomba.*

It can be concluded from the above review that Andrographis paniculata is the source plant of *Kalamegha* .

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