

Therapeutic Efficacy of RopanaTaila on Wound: A Literary Review

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ABSTRACT

The increasing prevalence of wounds have an impact on the healthcare system. Living with a wound can significantly impact one's quality of life. Physical injuries that induce an opening (or break) in the skin and disrupt the normal structure and function of the skin are known as wounds. Plant-based remedies have been used for thousands of years to treat and repair wounds. All Indian medical traditions, including Ayurveda, Siddha, and Unani, mention using medications from plant, mineral, and animal origins to cure and heal wounds. Since they are so widely available, plants are given top priority, but only a small number of plant materials have scientific proof of their ability to heal wounds. RopanaTaila is classical ayurvedic formulation described in Sushruta Samhita in the chapter named 'Mishrak' indicated for the treatment of wound. It helps in wound healing. This article reviews therapeutic effects of various ingredients of RopanaTaila on wound.

KEYWORDS: Wound, Curcuma longa, Vranaropana, TilaTaila

I. INTRODUCTION

Dependancy of more than 80% of the world's population are upon traditional medicines for various skin diseases.[1] Compared to only 1-3% of modern medications, almost one-third of all traditional remedies are used to heal wounds and skin conditions.[2] In the process of healing wounds, many Ayurvedic plants play a crucial role. More than 70% of pharmaceuticals for treating wounds are made from plants, 20% from minerals,

and the remaining 30% from animal products.[3] The treatment of wound healing by medicinal plants has been the subject of extensive research. Herbal remedies for wound care involve cleaning, debridement, and supplying a moist atmosphere to promote the development of the ideal environment for the natural healing process.[4] In Sushruta Samhita, various medicinal plants as single and compound formulations having Vranashodhana (wound cleansing) and VranaRopana (wound healing) potential are enumerated.[5]

RopanaTaila is an ayurvedic classical formulation mentioned in Sushruta Samhita under chapter 37. It is indicated for Vranaropana (wound healing). There are 8 herbal drugs in RopanaTaila. eHaridra (Curcuma longa), Daruharidra (Berberis aristata), Devdaru (Cedrus deodara), Priyangu (Callicarpa macrophylla), Agar (Aquilaria agallocha), Tagar (Valerianawallichii), Lodhra (Symplocos racemosa) and TilaTaila (Sesamum indicum).[6]

Haridra (Curcuma longa Linn.)

Turmeric, also known as Curcuma longa, is a perennial herb that belongs to the Zingiberaceae (ginger) family. It is widely grown in Asia, primarily in China and India. A yellow powder is produced from the rhizome, the medicinal part of the plant. It is used predominantly as an anti-inflammatory.[7] A natural antiseptic, turmeric is frequently referred to as "Indian saffron." [8]

Categorisation of Haridra in classics

	DhanvantriNighantu [9]	RajdevNighantu [10]	KaydevNighantu [11]	Nighantu Adarsh [12]	BhavprakashNighantu [13]
Varga	GuduchyadiVarga	PippalayadiVarga	AushadhiVarga	AdrakadiVarga	HaritkyadiVarga
Synonyms	Pitika, Pinga, Rajni, Nisha, Gauri, Haldika, Vishaghni, Jayanti, Dirgharangi	Vishaghani, Varvarini, suwarna, Shiva, Varini, Dirgharaga, Varnadatri, Vara, Janistha, Subhaga, Shyama, Jayantika, Shipha, Lakshmi	Varini, Gauri, Peeta, Romashmulika, Harita, Vasihya, Rajni, Pindbhadra, Nisha, Pinda, Dhirgharanga	Haridra, Nisha, Gauri, Varvarini, Rajni, Yoshitpriya	Haridra, Kaanchni, Peeta, Krimaghani, Yoshitpriya, Hattvilasni, Nishaakhya, Varvarini

Rasa panchaka (Ayurvedic pharmacological property) of Haridra in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu[14]	Katu, Tikta	Ruksha	Ushna	-	Kaphavatanashak	Vrana, Prameha, Shotha, Raktadosha, Panduroga
BhavprakashNighantu[13]	Katu, Tikta Rasa	Ruksha	Ushna	-	Kaphapittanashak	Prameha, Shotha, Pandu, Vrana
Rajdev Nighantu[10]	Katu, Tikta	-	Ushna	-	KaphavataHara	Vrana, Prameha, Kandu
DhanvantriNighantu[9]	Tikta	Ruksha	Ushna	-	-	Vrana, Prameha, Kandu, Kustha, Visha
KaidevNighantu[11]	Titka, Katu	Ruksha	Ushna	-	Kaphapittanashak	Pandu, Vrana, Visha, Shotha
Nighantu Adarsh[12]	Tikta, KatuKashaya	-	Ushna	Katu	KaphaVata Hara	Kustha, Kandu, Vrana, Prameha
DravyaGuna Vigyana[15]	Titka, Katu	Laghu, Ruksha	Ushna	Katu	Kaphavatashamak	Shothaghana, Vedanasthapan, Kusthaghana, Vranashodhana, Vranaropana

Chemical constituents

Curcuminoids, a mixture of curcumin (diferuloylmethane), monodexmethoxycurcumin, and bisdesmethoxycurcumin, are the active components of turmeric. Curcumin accounts for approximately 90% of the curcuminoid content in

turmeric. Sugars, proteins, and resins are other constituents present in it. Curcumin, which makes up 0.3-5.4% of raw turmeric, is the active ingredient on which most of the research is done.[16]

Pharmacological activity

Antiinflammatory, anthelmintic, antiasthmatic activity, neuroprotective activity, anticancer activity.

Latest Researches

1. Comparative evaluation of anti-inflammatory activity of curcuminoids, turmerones, and aqueous extract of Curcuma longa- Study concludes potent anti-inflammatory activity of COFAE of C. longa.[17]
2. Immunomodulatory, anti-inflammatory, and antioxidant effects of curcumin - Study concluded the effects of anti-inflammatory, antioxidant and immuno-modulatory action of curcumin.[18]
3. Turmeric (Curcuma longa) Rhizome Paste and Honey Show Similar Wound Healing Potential: A Preclinical Study in Rabbits. - It was observed that the wound healing was statistically significantly faster (P < .01) in both treatment groups compared to the control group.[19]

4. Antioxidant Activity of Curcuma longa L., novel foodstuff. - Study was conducted on methanolic extract of curcuma longa. In vitro antioxidant study was performed. All fractions showed antioxidant activity.[20]
5. Evaluation of antimicrobial activity of Curcuma longa rhizome extract against Staphylococcus aureus – results showed that the methanolic fraction of C. longa rhizome had high potential to inhibit some pathogenic bacteria S. aureus to a greater degree than other fractions of C. longa.[21]

DARUHARIDRA (Berberis aristata DC)

Daruharidra, also known as Berberis aristata, is a member of the family Berberidaceae. It is a hard, spinous yellowish herb.[22] This plant is primarily cultivated in the sub-Himalayan region, the Nilgiri Hills of southern India, and hilly regions of Nepal up to a height of 2000–3500 metres.[23] The official source of drug are considered as roots of the plant.[24] The plant has traditionally been used to treat inflammation and wound healing. [25-26]

Categorisation of Daruharidra in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Guduchyadi Varga	Pippalayadi Varga	Aushadhi Varga	Daruharidradi Varga	Haritkyadi Varga
Synonyms	Peetdru, Peetchandan, Kastharajni, Kaliyak, Darunisha, Darvi, Peetdaru, Hemkanta, Kusumbhaka	Peetdru, Kaliyak, Peetdaru, Sthirraga, Kamini, Kaamvati, Pachampcha, Karkatikini, Darunisha	Katankteri, Darvi, Darunisha, Nisha, Peeta, Peetdru, Hemkanti, Peetchandan, Peetdaru, Katankti	Darunisha, Daruharidra, Darvi, Pachampcha, Katanktari	Darvi, Daruharidra, Parjani, Peeta, Pachampcha, Kaliyak, Peetdaru, Peetak, Peetdru

Rasa Panchaka (Ayurvedic Pharmacological property) of Daruharidra in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Katu, Tikta	-	Ushna	-	Vatanashak	Prameha, Kandu, Vrana, Visha
Bhavprakash Nighantu [13]	Katu Tikta Rasa	Ruksha	Ushna	-	Kaphapittanashak	Prameha, Kandu, Vrana, Shotha
Rajdev Nighantu [10]	Tikta, Katu	-	Ushna	-	-	Vrana, Prameha, Kandu
Dhanvantri Nighantu [9]	Tikta	Ruksha	Ushna	-	-	Vrana, Prameha, Kandu
Kaidev Nighantu [11]	Tikta,	Ruksha	Ushna	-	Kaphapittanashak	Pandu, Vrana,

	Katu					Visha, Shotha
Nighantu Adarsh[12]	Tikta, Katu	Rukshs	Ushna	Katu	KaphapittaHara	Kustha, Kandu, Vrana, Prameha, Vranashotha
DravyaGuna Vigyana[15]	Tikta, Kashaya	Laghu, Ruksha	Ushna	Katu	Kaphapittahara	Shothahara, Vedanasthapana, Vranashodhana, Vranaropana, Raktastambhana

Chemical constituents

Berberis aristata contains the alkaloidsberbamine, Berberine, oxycanthine, epiberberine, palmatine, dehydrocaroline, jatrorhizine, karachinedihydrokarachine, taximaline, oxyberberine, aromoline and columbamine [27] as well as terpenoids, flavanoids, sterols, anthocyanins, lignans, vitamins, proteins, lipids and carotenoids.[28-29]

Pharmacological activity

Anti-Diabetic, Anti-Microbial, Antihemorrhagic, Anti-Cancer, Anti-Lipidemic, Anti-HIV, Anti-Pyretic, Anti-Inflammatory.[30]

Latest Researches

1. Anti-inflammatory and anti-granuloma activity of Berberis aristata DC. in experimental models of inflammation - Anti-inflammatory and anti-granuloma activity of BA hydroalcoholic extract (BAHE) were evaluated in experimental models. Results showed that treatment with BA effectively inhibited the inflammation, granuloma formation, and serum TNF- α level and exhibited immunomodulatory activity on macrophage-derived mediators.[31]
2. Study of phytochemical, antioxidant, antimicrobial and anticancer activity of Berberis aristata - Study of antimicrobial and antioxidant activity in assay

like DPPH (Diphenyl-2-picrylhydrazyl) assay, hydrogen peroxide assay and reducing power assay was done. The plant extract also showed antifungal and antibacterial activity against major pathogens like C Albicans, S typhii, P aeruginosa and E coli. Also, the extract showed antioxidant activity comparable to that of L Ascorbic Acid.[32]

3. Pharmacological Investigation of Berberis Aristata (Berberidaceae) For Its Antipyretic and Analgesic Activity In Laboratory Animals - study was focussed on analgesic and antipyretic effects of ethanolic extract of B. aristata (EEBA) stem in animal models. Study concluded that the ethanolic extract of Berberis aristata (EEBA) possessed a significant antipyretic activity and has both central and peripheral analgesic activity.[33]

DEV DARU (Cedrus deodara Roxb.)

Cedrus deodara, common cedar, is an important plant belonging to the family Pinaceae. Its widespread distribution in tropical and subtropical regions; the species that make up the genus are trees that are sometimes grown for ornamental or traditional cultural uses.[34] Most essential oils are produced from the plant that have great medicinal and pharmaceutical use. Oil and plant extracts are used to treat a variety of conditions, including inflammations, itching, skin and blood diseases.[35]

Categorisation of Devdaru in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Guduchyadi Varga	Chandanadi Varga	Aushadhi Varga	Devdarvadi Varga	Kapuradi Varga
Synonyms	Daru, Surahava, Kilima, Snehavidha, Mahadaru, Bhadradaru, Devkastha, Surdaru, Indravriksha & Amardaru	Surdaru, Daruk, Snigdhadaru, Amardaru, Bhadradaru, Shivdaru, Shambhav, Rudradaru,	Devkastha, Bhadrakastha, Shakdru, Kilim, Daru, Bhadradaru, Surahva	Devdaru, Surahava, Surdaru, Kilim, Bhadradaru, Peetdru, Putikastha, Surkastha	Devdaru, Darubhadra, Indradaru, Mastdaru, Kilim, Surbhuruha

		Bhuthari, Bhavdaru			
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Rasa Panchaka (Ayurvedic Pharmacological property) of Devdaru in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Tikta	Laghu, Snigdha	-	Katu	Vatanashak	Shotha, Kandu, Prameha, Raktavikar
Bhavprakash Nighantu [13]	Tikta	Laghu, Snigdha	Ushna	Katu	Vatanashak	Shotha, Jwara, Raktadosha, Prameha, Kandu
Rajdev Nighantu [10]	Tikta	Snigdha	Ushna	-	KaphavataNashak	Arsha, Prameha, Jwara
Dhanvantri Nighantu [9]	Tikta	Snigdha	Ushna	-	KaphavataNashak	Aamdosha, Adhamana, Prameha
Kaidev Nighantu [11]	Tikta, Katu	Laghu, Snigdha	Ushna	Katu	KaphavataNashak	Kandu, Shotha, Jwara, Prameha
Nighantu Adarsh [12]	Tikta	-	Ushna	Katu	VatakaphaNashaka	Shotha, Kustha, Vatvrana, Kaphakasa
Dravya Guna Vigyana [15]	Tikta	Laghu, Snigdha	Ushna	Katu	Kaphavatahara	Shothahara, Vedanasthapana, Kusthaghana, Krimighana, Vranashodhana, Vranaropana

Chemical constituents

Sesquiterpene (i.e., α - himachalene (12.5%) and β -himachalene (43%))[36] are the principle constituents of the oil and associated with them are sesquiterpene alcohols (himachalol, allohimachalol, himadarol, isocentdarol and centdarol.[37] 9-hydroxy-dodecanoic acid, ethyl laurate, ethyl stearate, beta-sitosterol, shikimic acid, ferulic acid, beta-glucoside. (-)-Matairesinol, (-)- nortrachelogenin, and a dibenzylbutyrolactollignan (4, 4', 9-trihydroxy-3, 3'-dimethoxy-9, 9'-epoxy)lignan) were all found to be powerful antioxidants. There are tannins, saponins, flavonoids, and alkaloids in the leaf part. [38-39]

Pharmacological activity

Spasmolytic, anti-inflammatory, antibacterial, antifungal, antiseptic, antiviral, immunomodulatory, analgesic, antipassive cutaneous activity.[40]

Latest Researches

1. Studies on the anti-inflammatory and analgesic activity of Cedrus deodara (Roxb.) Loud. wood oil - The oral anti-inflammatory and

analgesic properties of wood oil from Cedrus deodara were investigated. It significantly inhibited both the exudative-proliferative and chronic phases of inflammation, as well as the edema that was caused by carrageenan in rat paws. The oil at both tested doses was found to possess analgesic activity when tested against acetic acid-induced writhing and hot plate reaction in mice.[41]

2. Evaluation of antioxidant and antimicrobial activities in various extracts of Himalayan medicinal plants - Their antioxidant activities were evaluated using free radical scavenging assay, reducing power, total antioxidant capacity and total phenolic contents. Against the DPPH radical, each fraction demonstrated significant radical scavenging activity. All of the extracts were found to be effective against various gram-positive and gram-negative bacteria strains.[42]

PRIYANGU (Callicarpa macrophylla Vahl.)

Callicarpa macrophylla, also known as Priyangu, is a member of the Verbenaceae family. In the world, Callicarpa macrophylla is widely dispersed over South East Asia, Bhutan, China,

India, and Burma. [43]It is said that the plant can treat burns and stop internal and external bleeding.[44]People in the Chamoli district of

Uttarakhand, India, use warmed leaf infusion to treat arthritis pain. [45]Cuts and wounds can be healed with the bark. [46]

Categorisation of Priyangu in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	ChandanadiVarga	AamradiVarga	DhanyaVarga	PadmakadiVarga	KapuradiVarga
Synonyms	Priyavalli, Phalini, Kanguni, Priya, Vritta, Govandani, Shyama, Karambha&Varnabhedni	Phalini, Shyama, Privalli, Phalapriya, Gauri, Govandani, Vrita, Karambha, Bhangura, Parnabhedini, Mangala, Shreyasi, Shubha, Kanguni	Peettandulik, Kangu, Durjara	Priyangu, Vishwakshenkanta, Gandhapriyang, Phalini	Priyangu, Phalini, Kaanta, Lata, Gundra, Gandhphala, Shyama, Priya, Vishwaksenagna

Rasa panchaka (Ayurvedic pharmacological property) of Priyangu in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Tikta, Kashaya	-	Sheeta	-	Kaphapittanashak	Kustha, Gulma, Prameha, Vishanashaka
Bhavprakash Nighantu [13]	Tikta, Kashaya	Guru	sheeta	-	Kaphapittanashak	Raktatar. Daha, Jwara, Visha
Rajdev Nighantu [10]	Tikta	-	Sheeta	-	Pittahara	Vamana, Bhrama, Jwara
Dhanvantri Nighantu [9]	Tikta	-	sheeta	-	-	Daha, Jwara, Vamana, Raktapitta
Kaidev Nighantu [11]	-	Guru, Ruksha	-	-	Kaphanashak	-
Nighantu Adarsh [12]	Tikta	-	Sheet	Katu	Pittakaphanashak	Sandhaniya, Shonitsthapana, Vranaropana,
Dravya Guna Vigyana [15]	Tikta, Kashaya, Madhura	Guru, Ruksha	Sheeta	Katu	Tridoshashamak	Vedanasthapana, Vishaghana, Jwaraghana

Chemical constituents

Alcoholic stem extract revealed the presence of glycosides, flavonoids, tannins, carbohydrates, steroids, and alkaloids while the absence of proteins, amino acids, and saponins.[47] Essential oil (diterpene) calliterpenone, and calliterpenone monoacetate are found in the roots and aerial portion. Oleanolic acid, calliterpenone, and calliterpenone-17-acetate are found in the

seeds. Oleanolic acid, calliterpenone, luteolin, beta-sitosterol, ursolic acid, apigenin, diterpene – calliphyllin, and crategolic acid are tetracyclic diterpenes. [40]

Pharmacological activity

Antibacterial activity,[48] Analgesic activity,[49] Anti-inflammatory activity,[50]Antifungal

activity,[51] Anti-diabetic,[52] hepatoprotective activity,[53] anti-arthritis activity.[54]

Latest Researches

1. Preliminary Assessment of Anti-Inflammatory Activity of *Callicarpa macrophylla* Vahl. Leaves Extracts - The anti-inflammatory activity of leaf extracts was evaluated using the carrageenan paw edema method. In comparison to standard medication, the ethanolic and aqueous extracts of *Callicarpa macrophylla* leaf extracts significantly reduced inflammation during the acute phase.[50]
2. In vitro Evaluation of Antifungal Activity of *Callicarpa macrophylla* Vahl. Leaves - Using the agar-well diffusion method, the antifungal activity of *C. macrophylla* leaf extract was determined. It is possible to draw the conclusion that the antifungal properties of *C. macrophylla* leaves are comparable to those of synthetic fungicides that are already widely available on the market.[55]
3. Evaluation of Antibacterial Activity of *Callicarpa macrophylla* Vahl. Stem Extracts- The antibacterial activity of the stems against various gram-positive and gram-negative bacterial strains was tested in vitro. According to the findings, both the ethanolic extract of *C. macrophylla* and the aqueous extract must contain distinct anti-salmonella compounds that may have a distinct effect on this bacterium. It may have a broad spectrum in general.[56]
4. Assessment of anti-inflammatory and analgesic activities of *Callicarpa macrophylla* Vahl. roots extracts - Evaluation of analgesic and anti-inflammatory properties using the carrageenan paw edema method and the tail immersion

model. Following oral administration of the ethanolic and aqueous extracts of *C. macrophylla* Vahl's leaves and roots, a significant reduction in the painful sensation caused by tail immersion in warm water was observed. In comparison to standard medication, the ethanolic and aqueous extracts of *Callicarpa macrophylla* root had a significant anti-inflammatory effect during the acute phase of the inflammation process. One or more of the phytoconstituents that may inhibit histamine, serotonin, or prostaglandin synthesis may be responsible for the anti-inflammatory activity.[57]

5. Evaluation of Immunomodulatory and Antioxidant activities of polysaccharides isolated from *Callicarpa Macrophylla* Vahl - This study examines the immunomodulatory and antioxidant properties of three polysaccharide fractions isolated from *Callicarpa macrophylla* Vahl. All three fractions demonstrated strong immunomodulating activity, indicating that they can positively influence our immune system. It demonstrated antioxidant activity comparable to that of the standard ascorbic acid.[58]

AGAR (*Aquilaria agallocha* Roxb.)

Aquilaria agallocha belongs to the family Thymelaeaceae. In addition, it is referred to as eaglewood in English, Agarwood in Hindi, Oodh in Urdu, Aguru in Sanskrit, Sasi or Sashi in Assamese and heartwood aloewood in English.[59] The tree is famous for its agarwood, a resinous and fragrant heartwood that is frequently used in Ayurveda and traditional medical practice.[60] Its bark, root, leaves, and heartwood are typically employed for their medicinal benefits.[61]

Categorisation of Agar in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Chandanadi Varga	Chandanadi Varga	Aushadhi Varga	Agruvadi Varga	Kapuradi Varga
Synonyms	Pravar, Loha, Krimijagdha, Anaryak, Krishnagru, Swaadagru, Yogaj & Vishwarupak	Kalaagru, Agru, Shringaar, Diswarupak, Shirsha, Vasuk, Kasthaka, Vallar, Gandharajaka	Krishnaagru, Shresthavriksha, Jongak, Krimijagdh, Malin, Shirshak, Kaleya, Agru, Pravar	Agru, Rajarha, Loha, Krimaj, Jongak, Kalaagru	Agru, Pravar, Loha, Yogaj, Vanshik, Krimaj, Krimijagdha, Anaryak

Rasa panchaka (Ayurvedic pharmacological property) of Agar in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Tikta, Katu	Laghu	Ushna	-	VatakaphaNashak	Karnaroga, Netraroga
Bhavprakash Nighantu [13]	Katu, Tikta	Tikshna	Ushna	-	VatakaphaNashak	Karna-akshiRoga
Rajdev Nighantu [10]	Katu Kashaya	-	Ushna	-	Vatahara	Pittajvikar
Dhanvantri Nighantu [9]	Katu, Tikta	Snigdha	Ushna	-	Vatakaphashamak	Kustha, Karnashool, Netrapeeda
Kaidev Nighantu [11]	Katu, Tikta	Laghu, Tikshna	Ushna	-	VatakaphaNashak	Karna-akshiRoga
Nighantu Adarsh [12]	Katu, Kashaya	-	Ushna	Katu	VatakaphaNashak	Kustha, Shotha, Vranashodhana
Dravya Guna Vigyana [15]	Titka, Katu	Laghu, Ruksha	Ushna	Katu	Kaphavatashamak	Shothaghana, Vedanasthapan, Kusthaghana

Chemical constituents

It contains carbohydrate, tannin, saponin, anthroquinone, protein, amino acid, alkaloid, glycoside, fixed oil and fat and terpenoid.[62]

Pharmacological activity

Antioxidant,[63]Antibacterialactivity,[62]

Analgesic activity, Anti-inflammatory activity [64]

Latest Researches

1. Antioxidant activity of ethyl acetate extract of *Aquilaria agallocha* on nitrite-induced methaemoglobin formation-In human blood hemolysate, the inhibitory effect of EAA on nitrite-induced oxidation of haemoglobin was evaluated in vitro at various concentrations. At different concentrations its antioxidant effect was tested.EAA was found to have antioxidant activity even at lower concentrations.[63]
2. Phytochemical and antimicrobial screening of extracts of *Aquilaria agallocha*Roxb. - The agar well method was used to investigate the methanol and aqueous extracts of *A. agallocha* leaf and bark's antibacterial activity. According to the findings, the leaf's methanol extract had the highest inhibition zone against *B. subtilis* (19 mm). All of the other extracts had

moderate inhibition zones of 14 to 18 mm against all of the tested bacteria. [62]

3. Analgesic and Anti-Inflammatory activity of Heartwood of *Aquilaria Agallocha*In Laboratory Animals - Analgesic activity was evaluated by using tests such as Acetic acid induced writhing in mice, Formalin induced paw licking in mice and Tail flick method in mice. Research findings shows that the EAA treatment had reduced the intensity of acetic acid induced abdominal constriction in mice. Anti-inflammatory activity was tested by Carrageenan induced paw edema in rat and Cotton pellets induced granuloma. All three phases of edema were equally inhibited by EAA, indicating that the extract inhibits the release of these endogenous mediators in anonselective manner.The analgesic and anti-inflammatory effects of EAAare confirmed by the study. [64]

TAGAR (Valerianawallichii DC.)

Valerianawallichii also known as Tagar, is a hairy perennial herb belongs to Valerianeaceae family. It grows up to 3,000 meters above sea level in temperate Himalayan and Khasia hills. [65]It has been employed in the indigenous medical system to treat inflammatory diseases. It has also proven

helpful for pain disorders. Its essential oil possesses

antimicrobial activity. [66]

Categorisation of Tagar in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Chandanadi Varga	Karveeradi Varga	Aushadhi Varga	Jatamasni Varga	Kapuradi Varga
Synonyms	Kutil Vakra, Deen, Jihwa, Nata, Shath, Kalanusaryak, Anriju, Kunchita, Nahush & Nripa	Kutil, Vakra, Kunchit, Natta, Nahusha, Rajaharshan, Parthiv, Kalaanusarak, Chatra, deen, Dadruhasta, jihna	Tagar, Kutil, Nata, Shath, Kalaanusaryak, Nahusha, Nripa, Vakra, Bahirasth	Tagar, Kutil, Nata, Jihna, Vakra	Kalaanusarya, Tagar, Kutil, Nahusha, Nata, Pindatara, Dandhasti

Rasa panchaka (Ayurvedic pharmacological property) of Tagar in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Madhura	Laghu, Snigdha	Ushna	-	Tridoshahara	Visha, Apasmar, Netraroga, Shiroroga.
Bhavprakash Nighantu [13]	Madhura	Snigdha, Laghu	Ushna	-	Tridoshahara	Shoola, Visha, Netraroga, Apasmaar
Rajdev Nighantu [10]	Tikta	-	Sheet	-	-	Netravikar, Visha, Unmaad
Dhanvantri Nighantu [9]	Kashaya	Snigdha	Ushna	-	Tridoshahara	Visha, Netraroga, Apasmaar. Shiroroga
Kaidev Nighantu [11]	Madhura, Tikta, Katu, Kashaya	Laghu, Snigdha	Ushna	Katu	Tridoshahara	Visha, Netraroga, Apasmaar. Shiroroga
Nighantu Adarsh [12]	Madhura, Tikta, Katu	Laghu	Ushna	Katu	VatapittaNashak	Kustha, Vatarakta, Stanyashudhi
Dravya Guna Vigyana [15]	Tikta, Katu, Kashaya	Laghu, Snigdha	Ushna	Katu	Kaphavatanashak	Vedanasthapana, Vranaropana, Vishaghana, Swashara

Chemical constituents

Its root contains Actinidine, carotene, calareanol, valeranal, coniferin, hexacosanic acid. 1-homoacevaltrate etc. Plant contain active ingredients like valerosidate, valeriotetrate A, hexacosonic acid, valeriosidatum etc. Rhizomes and Root constitute of active chemicals like flavonoids such as hesperidin, naphthoic acid, valepotriates, valeranone, dihydrovaltrate. Root oil consists of limonene, nerolidol, angelic acid, valerene, borneol, nerolidol, maaliol. [67] Other active

constituents of Valerianawallichii are sesquiterpenes, 6-methyl apigenin and hesperidinoids. [68]

Pharmacological activity

Analgesic, antibacterial, Antioxidant, anti-inflammatory, antispasmodic, diuretic, carminative. It could be employed as sedative. [69]

Latest Researches

1. Antimicrobial and anti-inflammatory activities of leaf extract of Valerianawallichii DC - Agar well diffusion method was used to measure the antibacterial and anti-inflammatory properties of the leaf extract of Valerianawallichii. *S. flexneri*, *S. typhi*, *B. subtilus*, and *S. aureus* were all inhibited by the antibacterial properties of various fractions of the methanolic extract of *V. wallichii*. The effect of carrageenan-induced paw oedema on the anti-inflammatory capacity of *V. wallichii* leaf extract was examined. In comparison to NSAID products, the crude methanolic leaf extract of *V. wallichii* had a significant anti-inflammatory effect during both phases of inflammation.[70]
2. Antioxidant and Hepatoprotective Activity of Ethanol Extract of Valerianawallichii in CCl4 Treated Rats - The tests showed a significant antioxidant potential of the extract in both In vitro antioxidant tests.[71]
3. A Study on Analgesic Activity of Valerianawallichii (Tagara) With Comparison to Standard Drug Piroxicam In Male Albino Rats - In this study, using Tail flick method in male Albino rats it was concluded that Valerianawallichii has potent analgesic activity.[72]

LODHRA (Symplacosracemosa Roxb.)

Symplocosracemosa Roxb. is a small evergreen tree. It is a member of the Symplocaceae family.[73] It can be found in all nations that are tropical or subtropical. Numerous compounds in the plant have been linked to a variety of effects in conventional medical systems including Ayurveda and Unani.[74] It aids in wound cleansing, stops bleeding, and initiates a quick healing process. Additionally, it stops bleeding, cleans wounds, and kickstarts a quick healing process. It is also helpful in cleaning of wound, holds bleeding and initiates fast healing process. The bark of the plant has anti-inflammatory & anti-microbial properties.[75]

Categorisation of Lodhra in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Chandanadi Varga	Pippalayadi Varga	Aushadhi Varga	Rodhradi Varga	Haritkyadi Varga
Synonyms	Rodhra, Shaabraka, Tilak, Tiritak, Kandheen, Bhilli And Shabarpadap	Karmuka, Pattika, Valkarodhra, Jirnabudhra, Jirnapatra, Akshibhais haj, Shavar, Valkal, Lakshapras ad	Tirit, Tilvak, Kaanin, Shaabrak, Brihattwak, Maarjan, Ghantwak, Akshibhaishaj	Rodhra, Lodhra, Akshibhaishaj, Shaavrak, Tiritak, Gaalav	Lodhra, Tilva, Tirit, Shavar, Galav, Kramuk, Jeernapatra, Brihatpatra, Patti, Laksha, Prasadana

Rasa panchaka (Ayurvedic pharmacological property) of Lodhra in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram Nighantu [14]	Kashaya	Laghu	Sheet	-	Kaphapitta Hara	Shotha, Atisaar, Visha, Raktadosha
Bhavprakash Nighantu [13]	Kashaya	Grahi Laghu	Sheet	-	Kaphapitta Hara	Raktapitta, Atisaar, Jwara, Shotha
Rajdev Nighantu [10]	Kashaya	-	Sheet	-	Vatakaphahara	Raktavikar, Vishajanya Vikar, Netravikar

Dhanvantri Nighantu [9]	Kashaya	Ruksha, Grahi	Sheet	-	Kaphanashak	Visha, Trishna, Arochak
Kaidev Nighantu[11]	Kashaya		Sheet	Katu	Kaphapitta Hara	Shotha, Atisaar, Trishna, Visha
Nighantu Adarsh [12]	Kashya	-	Sheet	Katu	Kaphapitta Hara	Kushtha, Vrana, Kasa
Dravya Guna Vigyana [15]	Katu, Tikta	Laghu, Ruksha, Tikshna	Ushna	Katu	Kaphavatashamak	Kusthaghana, Shothahara, Vednasthapan

Chemical constituents

It constitutes of colluturine, loturidine, oxalic acid, phytosterol, betulinic, acetyloleanolic, oleanolic and ellagic acids. It include flavonoids, phenols, tannins, saponins and glycosides.[76] Several flavonoid glucosides like symplocoside, symposide, leucopelargonidine-3 glucoside, ellagic acid, rhamnetin 3-digalactoside, triterpenoids like 19 α -hydroxy acetic acid³, 28-O-bis- β -glucopyranosides, betulin, lino-leic acid, β -sitosterol and α -amyrin and alkaloids like oturine, loturidine, colluturine and harmine are seen as chief bio actives from the plant.[77]

Pharmacological activity

Anti-inflammatory activity, Analgesic, Antidiarrhoeal,[78] spasmogenic, Anticancer activity, Hepatoprotective activity, Anti-angiogenic activity, Antioxidant,[79] Antimicrobial.[80]

Latest Researches

1. Antidiarrhoeal, Anti-inflammatory and analgesic activities of Symplocosracemosaroxb. Bark - Both the hot plate method and the writhing test were used for the analgesic test. The evaluation of the anti-inflammatory response used the formalin test on mice and the carrageenan-induced paw

oedema test on rats. Crude extract of *S. racemos* displayed mild to moderate analgesic and anti-inflammatory response.[78]

2. Pharmacological Study of Symplocosracemose Roxb - Antioxidant activity of hydroalcoholic extract of Symplocosracemose was analysed using DPPH method. It showed good antioxidant activity. It also exhibits significant antioxidants, with around 78.59% radical scavenging activity.[79]
3. Antibacterial evaluation and phytochemical screening of Symplocosracemosa Roxb.- An antibacterial evaluation of the petroleum ether and ethanolic extract was carried out and result showed that ethanolic extract possess a good antibacterial action.[80]

TILA TAILA (Sesamum indicum Linn.)

Sesame is an annual crop of height between 1.6 and 3.3 ft, belongs to Pedaliaceae family. The seeds of the plant are small in size, oval and slightly flattened. These are rich in oil and containing 35 - 57% oil, depending on the variety.[81] The "crown of eight grains" and a "all-purpose nutrient bank," sesame seeds are known for their high nutritional content. Additionally, sesame seeds are employed as topical ointment and pain reliever.[82]

Categorisation of Tila Taila in classics

	Dhanvantri Nighantu [9]	Rajdev Nighantu [10]	Kaydev Nighantu [11]	Nighantu Adarsh [12]	Bhavprakash Nighantu [13]
Varga	Swaranadi Varga	Ksheeradi Varga	Dhanyavarga	Paatladi Varga	Dhanyavarga
Synonyms	Homdhanya, Pavitra, Pitratarpan, Papghana, Putadhanya	-	Tailaphala, Puta, Snehapurphala	Tila	Tila

Rasa panchaka (Ayurvedic pharmacological property) of Tila Taila in various texts

Nighantu	Raspanchak					Therapeutic Uses
	Rasa	Guna	Virya	Vipaka	Dosha Karma	
Shaligram	Madhura,	Snigdha,	-	Katu	Vatavinashak	Vrana,

Nighantu [14]	Tikta, Katu,	Ushna				Malrodhaka, Keshaya
Bhavprakash Nighantu [13]	Madhura, Tikta, Katu, Kashaya	Guru, Snigdha Ushna	-	Katu	Kaphapittahara	Keshaya, Vrana
Rajdev Nighantu [10]	Madhura, Tikta, Kashaya	Tikshna	Ushna	-	Kaphavatahara	Kandu, Krimi, Vrana
Dhanvantri Nighantu [9]	Madhura, Tikta, Katu, Kashaya	Guru, Snigdha	Ushna	Katu	Kaphapittakara	Vrana, Keshaya, Balya
Kaidev Nighantu [11]	Madhura, Tikta, Katu, Kashaya	Guru, Snigdha	Sheet	Katu	Vatanashak	Vrana, Keshaya, Medhaya
Nighantu Adarsh [12]	Madhura, Tikta, Katu, Kashaya	-	Ushna	Katu	Kaphapittahara	Vranashodhana, Vranaropana, Vatashoola,
Dravya Guna Vigyana [15]	Madhur, Kashaya, Tikta	Guru, Snigdha	Ushna	Madhura	Tridoshshamak	Vednasthapana, Vranashodhan, Vranaropana, Sandhaniya

Chemical constituents

Sesame contains many important functional components such as sesamin, sesamol, sesaminol, sesamol phenol ascorbic acid, biotine, and other lignan-like active ingredients. It includes lignans, polyphenols, phytosterols, phenols, aldehydes, anthraquinones, naphthoquinones, triterpenoids, and other organic compounds.[83-85]

Pharmacological activity

Analgesic, Antioxidant, hepatoprotective, antitumour, hypotensive.

Latest Researches

1. The Effects of Topical Sesame (Sesamum indicum) Oil on Pain Severity and Amount of Received Non-Steroid Anti-Inflammatory Drugs in Patients with Upper or Lower Extremities Trauma- Results indicated that topical sesame oil application is effective in reducing pain severity and reducing the frequency of received NSAIDs.[86]
2. Biochemical Composition, Antioxidant Power and Antiinflammatory of Dehulled Sesamum indicum Seeds and Its Coat Fraction- The anti-inflammatory activity was assessed using the carrageenan-induced rat paw oedema assay,

and extracts demonstrated the greatest inhibition of carrageenan (70% for 5% and 85.56% for 10%), compared to diclofenac at 1%, which produced an inhibition of 78.9%. DPPH testing and total antioxidant capacity were used to assess antioxidant activity. Results indicate an improved total antioxidant capability. [87]

3. In vitro evaluation of roots, seeds and leaves of Sesamum indicum L. for their potential antibacterial and antioxidant properties- Methanol and aqueous extracts of Sesamum indicum L. were screened to detect in vitro antioxidant DPPH and thiobarbituric acid (TBA)] and antimicrobial (disc diffusion and deep well diffusion) activity. Methanol extract, as opposed to aqueous extracts, demonstrated promising antimicrobial and antioxidant activity in various parts of S. indicum. [88]
4. Evaluation of the Wound Healing Activity of Sesame Oil Extract in Rats- The study found that rats treated with 0.2 sesame oil extract, 0.13 sesame oil extract, and 0.1 sesame oil extract had a better healing pattern than the control group. Sesamin extract groups had a significantly shorter wound length and a much faster rate of wound closure than control groups.[89]

PHARMACOLOGICAL ACTIVITIES OF PLANTS SUPPORTING WOUND HEALING

Anti-inflammatory activity

The inflammation phase of normal wound healing is crucial because it produces neutrophils, which are in charge of microbial clearance at the wound site (phagocytosis). In addition, growth factors and inflammatory cytokines are formed. Due to the net degradation of soluble growth factors and matrix components, any pathological activity that disrupts this self-contained physiological mechanism can prevent wound healing. [90-91] Research studies shows that all the herbal drugs present in RopanaTaila has shown anti-inflammatory activity.

Antimicrobial activity

It is believed that microorganisms play a significant role in the onset of infection-related issues and the sluggish healing of chronic wounds. The process of healing is slowed down by sepsis, which is caused by a bacterial infection. [92] Antimicrobial activity has been demonstrated by various research studies on each ingredient.

Antioxidant activity

It is well known that antioxidants can aid in the healing process of wounds. [93] All drugs present in RopanaTaila possess antioxidant activity.

Analgesic activity

Patients with wounds frequently experience pain. Neuropathic pain or tissue injury (nociceptive pain) are the physiological causes of wound pain. Pain may impede wound healing by misregulating immunological and neuroendocrine systems, which are essential to the healing process. Therefore, it is possible to treat wound pain with herbal remedies that have analgesic and anti-inflammatory properties. [94] As a result, herbal remedies with analgesic and anti-inflammatory properties can be used to treat wound pain. Daruharidra, Devdaru, Priyangu, Agar, Tagar, lodhra and TilaTaila all possess analgesic action when experimental studies were conducted.

II. DISCUSSION

There are three phases to wound healing: the inflammatory phase, the proliferative phase, and the remodeling phase. Each phase requires specific conditions for wound healing. [95] Most of the plants in the formulation are having predominance of Katu, Tikta and Kashaya Rasa.

Tikta and Katu Rasa have the Krimighana action (anti-bacterial and anti-fungal action). Wound healing is aided by antibacterial activity. [96-97] Additionally, Katu Rasa has an anti-inflammatory effect known as Shothahara. Tikta, Kashayarasadravyas also have the property of drying which aids in wound healing and reduces the period of inflammation that causes wounds to take longer to heal. [96] Due to its haemostasis property, SheetaVirya plays a more significant role during the inflammatory phase of the clotting process. The analysis of VranaRopana herbs indicates predominance of Madhura, Kashaya Rasahaving Madhura Vipaka and SheetaVirya. [6] It could be because Madhura Rasa aids in Dhatu Poshana (tissue regeneration) and Kashaya Rasadravyas aid in wound closure through their Sandhanakarma (tissue binding) actions. The majority of wound-healing herbs are said to also have antimicrobial properties. It is well stated that plants rich in tannins, flavonoids, saponins, sterols, phenols, and triterpenoids have the potential to heal wounds. [98] The plant's anti-inflammatory, antioxidant, and antimicrobial properties enhance wound healing.

III. CONCLUSION

This article is an attempt to present the literary review of the ingredients present in the formulation RopanaTaila. It helps in better understanding that presence of phytochemical constituents in the plants mentioned in the formulation like flavonoids, alkaloids, tannins etc gives anti-inflammatory, antioxidant and antimicrobial action. This pharmacological activity helps the formulation in the management of wound.

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