



Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18626

DOI URL: <http://dx.doi.org/10.21474/IJAR01/18626>



RESEARCH ARTICLE

REVIEW ARTICLE ON THE EFFECTS OF AYURVEDIC VARṆYA HERBS

Dr. Meha Sharma¹, Dr. Deepa², Dr. Manisha Khatri³ and Dr. P. C. Mangal⁴

1. P.G Scholar, Department of Kriya Sharir, Institute for Ayurved Studies and Research, Kurukshetra, Haryana-136118.
2. P.G Scholar, Department of Kriya Sharir, Institute for Ayurved Studies and Research, Kurukshetra, Haryana-136118.
3. Associate Professor, Department of Kriya Sharir, Institute for Ayurved Studies and Research, Kurukshetra, Haryana-136118.
4. Professor & HOD, Department of Kriya Sharir, Institute for Ayurved Studies and Research, Kurukshetra, Haryana-136118.

Manuscript Info

Manuscript History

Received: 28 February 2024

Final Accepted: 31 March 2024

Published: April 2024

Key words:-

Complexion, Skin Whitening, Skin
Lightening, Varṇya, Tyrosinase
Inhibition

Abstract

In the contemporary landscape, the desire for a luminous complexion has grown remarkably, steering individuals towards an inclination for fair skin. This quest for radiance is witnessing a distinctive shift towards an increased preference for natural products over their synthetic alternatives. The unfolding narrative in the realm of skin enhancement delves into a burgeoning realm, constantly enriched by updated insights and discoveries. Intricately woven into this narrative is the timeless wisdom of Ayurveda, where terms like varṇya, raktaprasadana, and tvacya illuminate the path to skin luminosity. Ayurveda not only encapsulates a historical perspective on skin care but also aligns seamlessly with modern methodologies. Tyrosinase inhibition, a contemporary approach to skin lightening (whitening), finds resonance in Ayurvedic principles, forming a bridge between tradition and innovation. As societal beauty standards evolve, this nuanced interplay between tradition and modernity underscores a unique trajectory in the pursuit of radiant skin. The convergence of ancient wisdom and cutting-edge research epitomizes a distinctive approach to skincare, where the desire for light skin is not merely a trend but a harmonious blend of heritage and progress.

Copy Right, IJAR, 2024,. All rights reserved.

Introduction:-

The contemporary landscape of wellness is a multifaceted tapestry that intricately weaves together beauty, health, fitness, and the pursuit of anti-aging solutions. Within this intricate web, the societal and medical significance of beauty, particularly the quest for fair skin, takes center stage, giving rise to an array of skin-lightening procedures like derma-abrasion, ultrasound, and laser therapy. The health of one's skin transcends the cosmetic realm, as unhealthy skin not only presents physical concerns but also gives birth to social issues, while healthy and intact skin becomes a catalyst for cheerfulness and confidence.

Corresponding Author:- Dr. Meha Sharma

Address:- P.G Scholar, Department of Kriya Sharir, Institute for Ayurved Studies and Research, Kurukshetra, Haryana-136118.

In this dynamic milieu, the fusion of traditional herbal medicines with modern skincare approaches emerges as a captivating avenue for developing innovative skincare cosmetics. Notably, the Indian cosmetic market is surging at an astonishing rate of 10.91%^[1] annually, outpacing the growth of leading markets in the US and EU.

The cradle of this beauty revolution lies in Ayurveda, where the timeless concepts of varṇa, chaya^[2], and prabha^[3] become the cornerstones of Ayur-cosmeceuticals. Varṇa, extending beyond mere color, encapsulates the entirety of a healthy and radiant complexion, while chaya envelops it, and prabha serves as the illuminator. Ayurveda's holistic and enduring approach to beauty unfolds as a unique, effective, and enduring paradigm, propelling the evolution of skincare towards a harmonious blend of tradition and contemporary ingenuity.

Concept of Varṇya (skin whitening) as per Ayurveda

In Ayurveda, the intricate process of fetal skin formation is attributed to rakta dhatu paka^[4]. The genesis of skin color (varṇa utpatti) is rooted in the elemental force of Agni mahabhuta, with pitta serving as the primary reservoir of this transformative energy. Within the realm of pitta, the bhrajaka pitta^{[5a][5b]}, situated specifically in the skin, assumes a central role in maintaining complexion through the expression of varṇa.

Prabha, a fundamental function of pitta, intricately contributes to the upkeep of complexion, while bhrajaka pitta becomes the radiant source manifesting the natural glow inherent in one's complexion through varṇa. Consequently, herbs possessing properties that assuage pitta and rakta, acting through their distinct rasa, vipaka or prabhava, are revered as varṇya. These botanical entities play a nuanced role in modulating elemental dynamics, not only fostering physical well-being but also optimizing the innate brilliance of complexion within the principles of Ayurveda. This intersection of ancient wisdom and scientific insight delineates the profound interplay of elemental forces underlying skin physiology and coloration in the Ayurvedic paradigm.

Modern concept of pigmentation^[6]

Human skin color is predominantly determined by the intricate processes of melanogenesis, where melanin pigments are synthesized and distributed by melanocytes in the basal layer of the epidermis. The two primary types of melanin, Eumelanin and Pheomelanin, play pivotal roles in defining skin tones, with variations in their density and distribution accounting for the diverse range of human pigmentation.

Genetically controlled processes, such as melanocyte development and the expression of melanosomal constituents, contribute to physiological pigmentation, while others, including melanin synthesis, distribution, and melanosome transport, become targets for modulation through skin-lightening agents. These agents, crucial in altering pigmentation on the skin's surface, intervene in melanogenesis pathways through methods like Tyrosinase inhibition, Mitf inhibition, MC1R down-regulation, interference with melanosome maturation, and promoting melanocyte loss.

Tyrosinase inhibition stands out as a widely reported method, with substances like hydroquinone and kojic acid impeding the enzyme's activity. Additionally, antioxidants, such as Vitamins A, B, C, and E, contribute to skin depigmentation by reducing melanin synthesis and countering free radicals. Vitamin A, particularly in the form of tretinoin, acts through exfoliation and increased turnover, while Vitamin C deactivates free radicals and inhibits tyrosinase. Vitamin E functions as an antioxidant, shielding against UV-induced hyperpigmentation.

Interestingly, traditional formulations, long used in cosmetics, exhibit activities that align with modern cosmetic needs. Recent trials have affirmed the efficacy of Indian herbs in both curative and cosmetic applications, bridging the gap between traditional wisdom and contemporary skincare formulations. This convergence highlights the potential of ancient knowledge in addressing modern cosmetic concerns, ushering in a harmonious blend of tradition and innovation in skincare practices.

Aim:-

This review delves into Seven Ayurvedic herbs, including those from Varṇya Mahakaṣaya, assessing their skin-lightening mechanisms through both Ayurveda and biomedical perspectives. The focus is on comprehensively understanding the efficacy of these herbs in promoting effective skin lightening.

Materials and Methods:-

The Ayurvedic literature comprehensively outlines over 200 herbs and minerals for enhancing skin. Notably, specific herbs from varṇya mahakaṣaya like Rakta Chandan, Manjistha, Kushta, Lodhra, Vatankura, Masura, and Priyangundergo a thorough assessment for their Varnya (skin-whitening) effects. This evaluation involves synthesizing information from various Ayurvedic texts and internet articles to substantiate the skin-lightening attributes of these herbs with varṇya properties.

Result:-

All seven herbs^[7] under review (Rakta Chandan, Manjistha, Kushta, Lodhra, Vatankura, Masura, and Priyangu demonstrate varṇya effects either directly (by varṇya karma) or indirectly (by mitigating pitta and rakta) in Ayurveda, while also interfering in the melanogenesis pathway through tyrosinase inhibition according to biomedicine. They possess various attributes, including wound healing, antiseptic properties, anti-inflammatory effects, anti-cancer potential, anti-melasma properties and the ability to enhance skin complexion^[8]. This underscores their potential as effective skin-whitening agents. The description^[9a]^[9b] of all drugs under review is as follows:

Rakta Candana (Pterocarpus santalinus)^[10]

Acharya Sushruta has described in Patoladi gana, Sarivadi gana, Priyanguawadi gana, Guduchyadi gana, Pitta Sanshaman and Salsaradi gana. Acharya Charak has explained in Daha Prashaman, Angamarda Prashaman, Trishna Nigrahan, Varnya, Kandughna, Vishaghna Mahakashaya and Tikta Skandha. The heartwood extracts of Pterocarpus santalinus demonstrate potent radical-scavenging, anti-inflammatory, anti-oxidant and anti-microbial properties. These activities, attributed to phenolic and polyphenolic compounds, include the scavenging of radicals like DPPH, nitric oxide, and hydrogen peroxide. Additionally, the heartwood extract showcases reductive capabilities and scavenging activity against various free radicals.



Manjistha (Rubia cordifolia)^[11]

Acharya Sushruta has described in Priyanguawadi gana, Pitta Sanshaman gana. Acharya Charak has explained in Varnya, Vishaghna and Jwarhara Mahakashaya. Esteemed for its skin-enhancing properties, this herb is renowned in skincare for promoting an even complexion and diminishing dark spots. It has Anti-inflammatory, anti-bacterial, radio protective, anti-oxidant, anti-ulcerative, wound healing properties. Ayurvedic attributes include Varnya, Rakta prasādhaka, and Rakta śodhaka (blood purifier). Comprising glucosides like Manjisthin and Purpurine, alongside resins, lime salts, and coloring agents, its methanolic extract exhibits significant tyrosinase inhibition, affirming its role as a potent skin whitening agent.

**Lodhra (*Symplocos racemosa*)^[12]**

Acharya Sushruta has described in Lodhradi gana and Nyagrodhradi gana. Acharya Charak has explained in Shonita Sthapan, Sandhaniya, Purisha Sangrahaniya Mahakashaya and Kashaya Skandha. Esteemed for its cleansing and soothing properties, this herb finds application in treating various skin ailments. Its extract, enriched with salireposides, exhibits documented efficacy against acne-producing bacteria. Additionally, it demonstrates a 6.60% mean tyrosinase inhibitory activity, positioning it as a valuable mild skincare herb.

**Kuṣṭha (*Saussurea lappa*)^[13]**

Acharya Sushruta has described in Eladi gana. Acharya Charak has explained in Shukra Shodhan, Aasthapanopaga, Lekhaniya Mahakashaya. The roots of this plant hold traditional indications for treating diverse skin disorders, including leprosy and erysipelas, and are valued for complexion improvement. In contemporary research, the methanolic extract of the crude drug demonstrated approximately 33.4% tyrosinase inhibition using a slightly modified dopachrome method, highlighting its efficacy as a skin whitening agent.



Priyangu(*Callicarpa macrophylla*)^[14]

Acharya Sushruta has described in Priyanguawadi gana and Anjanadi gana. Acharya Charak has explained in Mutra Virajaniya and Purisha Sangrahnaya Mahakashaya. Priyangu seeds and leaves boast unique compounds like Caliterpenone, its Monoacetate, Beta-sitosterol, and fatty acids. Recent research reveals a myriad of benefits, including anti-inflammatory, hepatoprotective, antifungal, anti-arthritis, antibacterial, analgesic, antidiabetic, and cytotoxic properties. Specifically, Priyangu proves beneficial for acne and pimples, leveraging its antibacterial and anti-inflammatory prowess to soothe the skin and promote a lighter complexion.

**Vatankura (*Ficus benghalensis*)^{[15][16]}**

Acharya Sushruta has described in Nyagrodhadi gana. Acharya Charak has explained in Mutra Sangrahnaya Mahakashaya and Kashaya Skandha. Acharya Bhav Mishra has explained it in Kshiri Vriksha and Pancha Valkal Varga. *Ficus benghalensis* demonstrates potent antioxidant activity primarily attributed to its phenolic compounds. The methanolic and acetone:water (70:30) extracts from its aerial roots exhibit comparable antioxidant potential, with scavenging activities against DPPH and ABTS⁺ radicals. Additionally, these extracts showcase notable antihemolytic and metal-chelating activities, establishing *F. benghalensis* as a promising source of natural antioxidants with diverse applications in oxidative stress management at the skin level also. Hence promoting complexion of skin.



Masoor (Lens culinaris)^[17]

This Drug is mentioned in Shimbi Kula and Aparajita upakula. Red lentils are a skin-friendly powerhouse, preventing rapid aging and acne. Their properties extend to skin lightening and tan removal, making them a versatile addition to skincare.

Varnya-Lepa drugs such as Raktachandana (*Pterocarpus santalinus* Linn.), Manjistha (*Rubia cordifolia* Linn.), Lodhra (*Symplocos racemosa* Roxb), Kustha (*Saussurea lappa* Linn.), Priyangu (*Callicarpa macrophylla*), Vatankura (*Ficus benghalensis*), and Masura (*Lens culinaris* Medic) exhibit skin-friendly attributes, including antioxidant activity, vitamins, photoprotective, flavonoids, and phenolic acids. These properties contribute to skin safety from UV rays, blocking both UVA and UVB. Additionally, they offer wound healing, antiseptic, anti-inflammatory, anti-cancer, and anti-chloasma benefits, promoting skin complexion. Specifically indicated for melasma, these herbs enhance skin tone and address hyperpigmentation.

| Drug | Rasapanchak | | Identification (Macroscopic) | Chemical Composition |
|-------------------------------|-----------------|---------------------------------------|---|------------------------------|
| Latin Name | | | | Part Used |
| Family | | | | |
| Rakta Chandan | Rasa: | Madhura, Tikta | Physical Characteristics: The drug presents as irregular pieces with a deep blood-red to dark purplish-red or almost black color. | Glycosides, Colouring Matter |
| <i>Pterocarpus santalinus</i> | Guna: | Ruksha, Guru | Texture and Hardness: It is characterized by a hard texture that can be easily split, indicating a certain level of brittleness. | Heart Wood |
| Fabaceae | Virya: | Sheeta | Odorless Nature: The drug is noted for its lack of odor, contributing to its neutral aromatic profile. | |
| | Vipaka: | Katu | Taste Profile: The taste is described as slightly astringent, suggesting a mild puckering or drying sensation upon consumption | |
| | Parbhav: | Pittahara, Netraroga, Visaghna, Vrşya | | |
| Manjiştha | Rasa: | Madhura, Tikta, Kashaya | Stem Characteristics: The stem is slender, cylindrical, and slightly flattened, exhibiting a wiry nature with a thickness of approximately 0.5 cm. It ranges in color from brown to purple, featuring a scabrous | Glycosides |
| <i>Rubia cordifolia</i> | Guna: | Guru | | Root |
| Rubiaceae | Virya: | Usna | | |
| | Vipaka: | Katu | | |

| | | | | |
|--------------------|-----------------|--|---|---|
| | Parbhav: | Kapha-pitta šāmaka, Varnya, Svarya, Visa, Sothaghna, Kuṣthaghna, Pramehaghna, Vr̥ṣya, Krmighna, Stambhana, Artavajanana, Rasāyana, Sonitasthāpana | surface marked by stiffness and longitudinal cracks. Surface Details: Prickles are noticeable in the immature stem, adding a textured element. Nodes are distinct, each bearing two leaf scars on opposite sides. Fracture of the stem is characterized as short. Powder Description: The powder is pink in color and comprises numerous fragments, including cork, lignified xylem vessels, tracheids, and fibers. Notably, pitted and reticulate xylem parenchyma with red-colored contents is present, along with acicular and sandy crystals forming black granular masses. | |
| Lodhra | Rasa: | Kashaya | Mature Stem Bark Characteristics: Occurs in channelled or curved pieces; occasional flat pieces up to 1cm thick. Outer surface uneven and rough due to fissures and cracks. | Alkaloids (loturine and coloturine) and red colouring matter. |
| Symplocos racemosa | Guna: | Laghu | Externally grayish-brown to grey; internally pale to whitish-brown. | Stem bark |
| Symplococaceae | Virya: | Sheeta | Fracture is short and granular in the cortical region, somewhat fibrous in the inner region. Taste is astringent and feebly bitter. Powder Description: Greyish-brown powder. Microscopic examination reveals fragments of cork, stone cells, fibers, prismatic and cluster crystals of calcium oxalate, and starch grains. | |
| | Vipaka: | Katu | | |
| | Parbhav: | Caksusya, Grāhi, Kaphapittanut | | |
| Kuṣṭha | Rasa: | Katu, Tikta | Drug Characteristics: Greyish to dull brown. Thick, stout, fusiform to cylindrical. Measures 7-15 cm in length, 1.0-5.5 cm in breadth. | Essential oil, alkaloid (saussurine) and bitter resin. |
| Saussurea lappa | Guna: | Laghu | Thicker roots with a collapsed center, occasionally ridged and wrinkled. | Root |
| Compositae | Virya: | Usna | Longitudinal and anastomosed, with rare rootlets. | |
| | Vipaka: | Katu | | |
| | Parbhav: | Karma Kaphavātajit, Raktaśodhaka, Varnya, Šukrala | Cut Surface Features: Shows two regions: outer periderm ring (thin) and inner porous woody portion (lighter in color). Inner portion exhibits fine radial striations, often with a collapsed central region. Fracture is short and horny. Odor and Taste: Odor is strong and characteristically aromatic. Taste is slightly bitter. Powder- Deep brown or rusty, under microscope irregular bits of yellow, brown or orange-red fragments of resins and oils | |

| | | | | |
|------------------------|-----------------|--|--|--|
| | | | associated with thin-walled parenchymatous cells, broken bits of xylem vessels with scalariform, reticulate thickening and horizontal end walls. | |
| Priyangu | Rasa: | Madhura, Tikta, Kashaya | Fruit Characteristics: Globose, 1 to 3 mm in diameter, yellowish-brown, with or without fruit stalk. 4-toothed, bell-shaped calyx, sometimes attached. Fruit contains four one-seeded pyrenes. Taste is astringent; no characteristic odor. Powder Description: Brown powder. Contains fragments of straight-walled, lignified cells of the seed coat. Oval to elongated, elliptical endocarp cells visible in surface view. Single and groups of elongated, oval to rectangular, lignified stone cells with concentric striations and a radial canal, featuring a narrow lumen. Presence of a few glandular and stellate hairs, along with pieces of polygonal endosperm cells. | Fixed Oil |
| Callicarpa macrophylla | Guna: | Ruksha, Sheeta, Guru | | Seeds/ flower bud |
| Verbenaceae | Virya: | Sheeta | | |
| | Vipaka: | Katu | | |
| | Parbhav: | Pittahara, Kaphahara, Snagrahi, Balya, Rakta prasadana | | |
| Vatankura | Rasa: | Madhura, Tikta, Kashaya | Aerial roots hang from the tree, providing support to branches upon touching the ground. The bark is thick and whitish. Leaf and Fruit Description: Leaves are thick, oval, measuring 4-6 inches in length. Fruits are red, round, with a spongy texture, and approximately 0.5 to 0.75 inches in diameter. Flowers are not visible on the tree; male and female flowers are enclosed in axillary, sessile, depressed red fruits. New tender buds appear in the summer along with fruits. Macroscopic Characteristics of Vatankur: Bud Characteristics: Length ranges from 1.3 to 4.5 cm, with a width from 0.5 to 1.3 cm. Conical in shape and exhibits a light to dark green color. Young leaves are simple, opposite, petiolate, and elliptical with an acute apex. Margins are entire, even, and smooth. Surface is hairy with unicostate reticulate venation. Dried Leaf Bud and Powder Description: Dried leaf buds are pale yellowish to brown. Vatankur powder appears light brown with | Leaf bud: sterols, flavanoids, phenol, tannins, and saponins |
| Ficus benghalensis | Guna: | Ruksha, Sheeta, Laghu | | Shunga |
| Moraceae | Virya: | Sheeta | | |
| | Vipaka: | Katu | | |
| | Parbhav: | Pittahara, Kaphahara, Snagrahi, Balya, Rakta prasadana | | |

| | | | | |
|----------------|-----------------|--|---|-------------------------|
| | | | a characteristic odor and taste. | |
| Masoor | Rasa: | Madhura, Kasaya | Seed Characteristics: Lens-shaped, smooth, approximately 4 mm thick. Greyish-brown and faintly mottled. Cotyledons are pink. Taste is characteristic. Powder Description: Cream-colored powder. Contains black particles due to pieces of testa. Fragments of thick-walled, elongated, oval to polygonal cells of the testa. Presence of a few sclerenchymatous cells in surface view. Irregular, wavy palisade-like cells. Simple, round to oval starch grains, up to 40 μ in diameter, with striations and a fissured hilum. | Flavonoids and Vitamins |
| Lens culinaris | Guna: | Ruksha, Laghu | | Dried Seed |
| Fabaceae | Virya: | Sheeta | | |
| | Vipaka: | Madhura | | |
| | Parbhav: | Samgrahi, Kaphapittashamaka, Raktapitta hara, Vātamayakara, Varnya, Grahi, Balya | | |

Discussion:-

In Ayurveda, the skin (Twacha) originates uniquely from Mamsa Dhatu^[18], emphasizing the interdependence of bodily elements for holistic health. The outermost layer of the skin, named “Avabhasini”^[19], contributes to skin pigmentation. Sunlight exposure to this layer results in the reflection of five distinct colors and shadows, collectively termed as “prabha”. Acharya Charak mentioned it as an organ covering whole body^[20]. Examined medications with Flavonoids, Saponins, and Glycosides suggest therapeutic advantages, including antioxidant and anti-inflammatory properties. More specifically, Flavonoids exhibit significantly higher antioxidant activity compared to Vitamin C and E, contributing to the protection of the skin against UV radiations and enhancement of skin texture. Rakta Chandan, Manjista, Kushta, Lodhra, Vatankura, Masoora, and Priyangu, enriched with Saponins and Glycosides, exhibit a unique synergy, offering protection against UV damage, inhibiting extracellular matrix degradation, tonifying the skin, reducing erythema and possessing anti-aging properties. The study highlights Ayurvedic herbs' versatile skincare benefits, blending traditional wisdom with modern research for effective skin lightening and tyrosinase inhibition. Examining physical characteristics suggests diverse applications, from complexion enhancement to addressing skin disorders, fostering innovative and holistic skincare formulations.

Conclusion:-

In conclusion, the herbs discussed today exhibit a rich array of properties with significant implications for skincare. Varnya drugs have been meticulously examined for their skin-enhancing effects. The unique combination of traditional Ayurvedic wisdom and modern biomedical insights unveils the nuanced mechanisms underlying skin lightening, with specific herbs showcasing tyrosinase inhibition and other key actions.

Furthermore, the thorough exploration of plant characteristics, from stems and bark to fruits and seeds, provides valuable insights into their physical and chemical attributes. The synthesis of Ayurvedic principles with contemporary scientific analysis brings forth a holistic understanding of these herbs potential in skincare. Their applications range from skin-whitening agents with tyrosinase inhibitory activity to remedies for various skin ailments, emphasizing their versatility in promoting skin health.

Overall, the compilation of data underscores the bridge between ancient herbal knowledge and modern dermatological perspectives, paving the way for the continued exploration and utilization of these botanical treasures in skincare formulations and treatments.

Financial Assistant:

Nil.

Conflict of interest:

Nil.

References:-

1. <https://www.thehindu.com/business/indian-beauty-market-may-grow-40-by-2026/article67619548.ec-e/amp/>
2. Charak Samhita, Indriya Sthana, 7/10, edited & translated by Pt.Kashinath Shastri, Chaukhambha Sanskrit Sansthana, edition,2014.
3. Charak Samhita, Indriya Sthana, 7/14-15, edited & translated by Pt.Kashinath Shastri, Chaukhambha Sanskrit Sansthana, edition,2014
4. Thaakar VJ, Charaka Samhita, Sutra Sthana 244 Chaukhambha Orientalia, Varanasi, 2014. Pg no 332.
5. a) Yadavji T.Sutra Sthana Chapter 21 verse 10. Charaka Samhita with Ayurveda Dipika Commentary. Reprint edition.Varanasi: Chaukhamba Orientalia;2013.p.101
6. b) Ashtanga Hridayam of Vagbhata Sutra Sthana; Kaviraja Atrideva Gupta; Chaukhamba Prakashan, Varanasi; Edition: reprint, 2015; 122
7. Skin Pigmentation Types, Causes and Treatment—A Review - PMC (nih.gov)
8. Shikha et al. Development and Physico-Chemical Analysis of Varnya Lepa Sunscreen Lotion (In-Vitro), Journal of Ayurveda and Integrated Medical Sciences | June 2022 | Vol. 7 | Issue 5; J Ayurveda Integr Med Sci 2022;5:34-40.
9. Rao G. Prabhakar A textbook of Sharangadhara Samhita, edition First, 2013, Chaukhambha Sanskrit Sansthan pg no- 396.
10. a) Sastry JLN, Chunekar KC, Drvyaguna Vijnana, Vol. 2, Edition: First 2004, Varanasi, Chaukhambha Orientalia, drug no. 88, 60, 69, 66, 171, 195,page no. 730, 277, 321, 307, 893, 941.
11. b)Sharma PV, Dravyaguna Vijnana, Vol. IV, Edition: Fourth-1993, Varanasi, Chaukhambha Bharti Academy, page no. 195.
12. Therapeutic Potential of Pterocarpus santalinus L.: An Update - PMC (nih.gov)
13. A comprehensive review of Rubia cordifolia L.: Traditional uses, phytochemistry, pharmacological activities, and clinical applications - PMC (nih.gov)
14. (PDF) Phytopharmacological Profile of Symplocos racemosa: A Review (researchgate.net)
15. (PDF) Chemical composition and pharmacological activities of Saussurea lappa: A review (researchgate.net)
16. (PDF) CALLICARPA MACROPHYLLA: A REVIEW OF ITS PHYTO-CHEMISTRY, PHARMACOLOGY, FOLKLORE CLAIMS AND AYURVEDIC STUDIES (researchgate.net)
17. (PDF) Ficus benghalensis Linn – The Sacred Indian Medicinal Tree with Potent Pharmacological Remedies (researchgate.net)
18. https://www.jsirjournal.com/Vol6_Issue4_07.pdf- Hafiz Abdul Khaliq. A review of pharmacognostic, physicochemical, phytochemical and pharmacological studies on Ficus benghalensis L., Journal of Scientific and Innovative Research 2017; 6(4): 151-163 (VATANKURA)
19. (PDF) Phytochemicals of lentil (Lens culinaris) and their antioxidant and anti-inflammatory effects (researchgate.net)
20. Charak Samhita, Vidyotini hindi commentary by P. Kashinath shastri and Dr. Goraknath Chaturvedi, published by Chowkhambha Sanskrit sansthan Varanasi Charak Chikitsasthana ch. 2007; 15: 16-17-18-19;456.
21. Sushruta Samhita, Ayurveda tatva Sandeepika hindi commentary Author: Kaviraj Ambikadatta Shastri published by Chowkhamba Sanskrit Sansthan Varanasi reprint edition Sushruta Samhita Shareerasthana ch. 2010; 4(4)
22. Shukla Vidyadhar, Tripathi Ravidutt, editors. Charak samhita of Agnivesha Delhi: Chaukhamba Sanskrit pratisthan; 2002; page no. 763.