



Review Article

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A LITERARY REVIEW ON GOKSHURADI GUGGULU WITH SPECIAL REFERENCE TO THE MANAGEMENT OF GOUT

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ABSTRACT

Ayurveda with safe and effective goodness has been pouring its valuable treasures to mankind since time unknown. Guggulu preparations are supposed to be one among the finest shaman aushadha in the Vata vyadhis. Literature enlists a number of such guggulu preparations in the management of Vatarakta. In the present study literature regarding Gokshuradi Guggulu quoted in Sharangadhar Samhita for the management of Vatarakta is expounded with all possible details. Individual drugs of the chosen formulation is expanded with respect to their synonyms, botanical details including Latin name, family, botanical description and parts used, Rasa Panchaka, chemical constituents and modern research references related to Gout that can prove beneficial for mankind.

Keywords: Guggulu, Gokshura, Gokshuradi Guggulu**INTRODUCTION**

Aushadhi has been given prime importance in Ayurveda as it is one among the trisutra.¹ Dravya or aushadhi has potential to bring about the reversal in the process of pathogenesis (samprapti vighatana) and eradication of the sign and symptoms. Acharya

Charaka said that there is no substance in the universe which can't be used as medicine, subject to rational use with definite object.² Gokshuradi Guggulu is mentioned in Sharangadhar Samhita, Madhyam Khanda 7/84-87 for the treatment of Vatarakta (Gout) containing following ingredients³

Table 1: Ingredients of Gokshuradi Guggulu

S. No.	Name of Ingredient	Latin Name	Family
1	Gokshura	<i>Tribulus terrestris</i>	Zygophyllaceae
2	Shuddha Guggulu	<i>Commiphora mukul</i>	Bursaraceae
3	Shunthi	<i>Zingiber officinale</i>	Zingiberaceae
4	Maricha	<i>Piper nigrum</i>	Piperaceae
5	Pippali	<i>Piper longum</i>	Piperaceae
6	Haritaki	<i>Terminalia chebula</i>	Combretaceae
7	Bibhitaki	<i>Terminalia bellirica</i>	Combretaceae
8	Amalaki	<i>Emblica officinalis</i>	Euphorbiaceae
9	Mustaka	<i>Cyperus rotundus</i>	Cyperaceae

Gokshura**Vernacular Name**

Hindi - Gokhru;
Telugu - Palleru Kaya;
Kannada - Neggilamullu, Sannaneggilu;
Kashmiri - Pakhda, Michikand;
Marathi - Gokharu, Sarate;
English - Caltrops fruit.

Synonyms

Svadamstra, Goksuraka, Trikantaka, Trikanta

Gana

Vidarigandhadi, Laghupancamula (Sushruta), Mutraviracaniya, Sothahara (Charaka)

Part used

Whole plant

Distribution

It is found throughout India, ascending to 3300 m. in Himalayan particularly common in dry and hotter parts of country.⁴

Chemical composition

Chlorogenin, diosgenin and its acetate, gitogenin, dioscin, 3-deoxy - Δ - diosgenin, ruscogenin, furostanol, spirostanol glycoside, spirosterol saponin, Saponins C and G, kaempferol, kaempferol - 3- glucoside, kaempferol -3- rutinoid, rutin, harmine, quercetin, neogitogenin, β -sitosterol, amino acid, harmaline, Harman and tetrahydroharmine.

Modern researches related to gout

According to a clinical study, significant analgesic effect of methanolic extract of *T. terrestris* was observed. The effect was evaluated by formalin and tail flick test in mice by Heidari in 2007. Herbo-mineral compound containing Gokshura showed better anti-inflammatory results and analgesic action in a study conducted by Katharia SK in 1992. Dashmoola kwatha containing roots of Gokshura and other drugs produce aspirin like antipyretic and anti-inflammatory effect in a study conducted by Gupta in 1984. The extract of fruits of *T. terrestris* showed significant dose dependent protection against urolithiasis induced by glass bead implantation in albino rats in a study performed by Anand in 1994.

Table 2: Ayurvedic Pharmacology of Ingredients

Name	Rasa	Guna	Virya	Vipaka	Doshagnata
Gokshura	Madhura	Guru, Snigdha	Sheeta	Madhura	Vata-pitta Shamaka
Guggulu	Katu, Tikta	Laghu, Sukshma, Tikshna, Sara, Picchila, Snigdha	Ushna	Katu	Vata Shamaka
Shunthi	Katu	Laghu, Snigdha	Ushna	Madhura	Vata-Kapha Shamaka
Maricha	Katu, Tikta	Laghu, Ruksha, Tikshna	Ushna	Katu	Vata-kapha Shamaka
Pippali	Katu, Tikta, Madhura	Laghu, snigdha	Anushna sheeta	Madhura	Kapha-vata Shamaka
Haritaki	Pancha Rasa yukta (Except lavana)	Laghu, Ruksha	Ushna	Madhura	Tridosha Shamaka
Bibhitaki	Kashaya	Laghu, Ruksha	Ushna	Madhura	Tridosha Shamaka Especially Kapha Shamaka
Amalaki	Pancha Rasa (Except lavana Rasa)	Ruksha, Laghu	Sheeta	Madhura	Tridosha Shamaka Especially Pitta Shamaka
Mustaka	Katu, Tikta, Kashaya	Laghu, Ruksha	Katu	Sheeta	Pitta-Kaphahara

Guggulu

The term 'Guggulu' is used for denoting both, the plant as well as its gum (oleo-resin). It has been mentioned in the Atharvaveda and the early medical texts of Charaka Samhita, Sushruta Samhita and Nighantus. It is a woody herb or a small tree and found extensively in Rajasthan, Gujarat and Maharashtra. Gum Guggulu is obtained by incision of the bark which is collected in the cold season. When gum (oleo-resin) is fresh, it is moisty, viscid, fragrant and of a golden colour. In dry form, it becomes stalactitic pieces, pale yellow, brown or dull green in colour, with a bitter aromatic taste and balsamic odour. It burns in fire, melts in sunshine and forms a milky emulsion with hot water. Two varieties of Guggulu i.e. Nava (Guggulu-fresh) and Purana Guggulu (old) have been mentioned in the text book of Ayurveda.⁵

Vernacular Name

Hindi – Guggal (Gugal);
Telugu – Mahishakshi Guggulu;
Kashmiri – Guggal Dhoop, Kanth Gan;
Malayalam - Gulgulu;
English - Gum-guggul, Indian Bdelium

Synonyms

Pura, Mahisakasha, Kaushika, Palankasha.

Gana

Eladi (Sushruta), Sangyasthapan (Charaka)

Part used

Gum (oleoresin).

Distribution

Found on the banks of the Ganges at Mayagunj, Bhagalpur and Orissa and in arid rocky parts of Rajasthan, Deccan and Mysore.

Chemical Composition

Oleo-resin containing 0.37% essential oil, Diterpene alcohol, Z-guggulsterone, E-guggulsterone 1,2,3,4-tetrol, Sesamin, kaempferol, Lignan, Guggulignans 1 and 2, β -sitosterol, Guggulsterols and ferulic acid, Monocyclic diterpenoids – viz., α -camphorene, camphorene, camphorene- A, three C-27 guggulsterols 1, 2 and 3 (in gum resin)

Pharmacological actions and uses

It is Vata-Kapha Hara, Pitta-Kara, Deepana, Balya, Rasayana, Vrishya and Bhagna-Sandhana-Kara. It is recommended as a drug of choice in the treatment of Medovaha Srotas and Vata diseases. It is advocated in diseases like, Vrana, Apachi, Granthi, Plehodra, Shopha, Arsha, Prameha, Kustha, Gandamala, Rheumatism, Medovaha Roga etc. Apart from this, it has been proved by Tripathi in 1974 to be a potent anti-inflammatory, hypo-lipidemic, hypo-cholesterolemic and anti-atherosclerotic agent in clinical as well as experimental studies.

Shunthi**Vernacular Names**

Hindi - Sonthi;
Telugu - Sonthi, Sunti;
Kannada - Shunthi;
Malayalam - Chukku;
Marathi – Sunthi;
English - Ginger root, Ginger

Synonyms

Ausadha, Muhausadha, Nagara, Visva, Visvabhesaja, srngavera

Gana

Triptighna, Deepaniya, Shulaprashamanarshoghna, Trishnanigrahan (Charaka) Pipalyadi, Trikatu (Sushruta), Panchkola, Trayushna (Bhava Prakash).

Part used

Fresh Rhizome (Aadraka), dried rhizome (Shunthi)

Distribution

In India, it is found in hotter states mainly in Kerala. Other than this, it grows in Bengal, Orissa, Karnataka, Madhya Pradesh and Himachal Pradesh.⁶

Chemical composition

The ginger rhizome contains 60% starch, 10% proteins, 10% fats, 5% fibres, 6% inorganic material, 10% residual moisture and 1-4% essential oil in a study conducted by Shrivastava KC in 1992. It contains dihydroparadol, gingerols and its mono and di-acetyl derivatives viz. gingerdiols 3-dihydroshogaols, sparadols, 1-dehydrogingerdiols, diarylheptanoids, and methyl ether derivatives of these compounds. Poly phenols, vitamin C, β -carotene, flavonoids, tannins; Ginger contains essential oils like zingiberene. It also contains pungent principles such as zingerone, gingerol and shogaol as per Yamahara in 1985.

Uses

The dry rhizome is emollient appetizer, laxative, stimulant, anodyne, aphrodisiac, and expectorant, carminative. It is useful in fever, dropsy, anorexia, dyspepsia, piles, cardiac, disorders, diseases of pharynx, hyperacidity, abdominal pain, vomiting, inflammation and rheumatoid arthritis.

Modern research related to gout

The effect of an aqueous extract of ginger on S. cholesterol and triglyceride levels as well as platelet thromboxane β_2 and prostaglandin E_2 production was examined on rats. It was found that low dose of ginger (50 mg/kg) administered did not produce any significant reduction in S. thromboxane β_2 level but high doses of ginger (500 mg/kg) were significantly effective in lowering S. PGE_2 when given orally or i. p. However, TXB_2 level were significantly lowered in rats given 500 mg/kg but not i. p. significantly reduction in S. cholesterol was also observed by Thomas M. in 2004. Gingerols and gingerol derivatives present in *Z. officinalis* showed excellent inhibition of LPS-induced PGE_2 production in a study conducted by Jolad SD in 2004. Experimental analysis has shown that ginger may inhibit synthesis of eicosanoid, both prostaglandins and leukotrienes that are inflammatory mediators produced from arachidonic acid.

Maricha

Vernacular Names

Hindi - Kalimirch;
Telugu - Miriyalu;
Kannada - Karimonaru, Menaru;
Malayalam - Kurumulaku;
English - Black Pepper

Synonyms

Vellaja, Krsna, Usana

Gana

Pipalyadi, Trayushna (Sushruta), Deepaniya, Shoolprashaman, Shirovirechana, Krimighna (Charaka)

Part Used

Fruit

Distribution

It is found in India, Malaysia, Indonesia, and Sri Lanka. In India, it grows in Kerala and Tamil Nadu, Karnataka and some parts of Assam.⁷

Chemical Composition

beta-caryophyllene, β -pinene, limonene, α -pinene, humulene in pepper berry oils, α -bisabolol, α -cubebene, elemol, bisabolene, α -guaiene, Piperine, piperidine, pipretine, chavicine, volatile oil, fats, riboflavin, nicotinic acid, Vitamin A. The essential oil present in fruits of *P. nigrum* consists of multiple chemical constituent viz. a-thujone, camphene, sabinene, a-phellandrene, myrcene, b-farnesene, b-bisabolene, linalool and terpinen-4-ol.

Modern research related to gout

Piperine displayed antipyretic effect in rabbits and analgesic activity in tail clip pressure in mice proved by Lee Eun Bang in 1984. Efficacy of piperine was also tested in a rat model of carrageenan induced arthritis. At the dose of 100 mg/kg dose, piperine showed almost same efficacy as prednisolone (10 mg/kg) which was used as a positive control. Piperine also provided anti-inflammatory, Antinociceptive and anti-arthritic effects in 2009 by study conducted by Bang. Constituent's present indifferent varieties of piper have reported *in vitro* inhibition effect against the enzymes responsible for synthesis of leukotriene and prostaglandin, 5-lipoxygenase and COX-1, respectively.

Pippali

Vernacular Names

Hindi - Pipar;
Telugu - Pippalu;
Kannada - Hippali;
Marathi - Pimpali;
English-Long Pepper.

Synonyms

Kana, Magadhi, Magadha, Krsna, Saundi

Gana

Pipalyadi, Urdhwabhagahara (Sushruta), Kasahara, Hikkaniyagrahana, Sirovirechana (Charaka)

Part used

Fruit, root

Distribution

It occurs in hotter parts of India from central Himalayas to Assam, Khasi, Mikir hills; from Konkan to Travancore.⁸

Chemical Composition

2 alkaloids piperlongumine and piperlonguminine (in stem and roots), n-hexadecane, n-heptadecane, n-octadecane, n-nonadecane, n-eicosane, terpinolene, zingiberene, p-methoxy acetophenone, 2 sesquiterpenes (essential oil from dried fruit) Piperine, pipartine, triacotane, reducing sugar, sesamine (roots), major alkaloid piperine and sesamin (stem and fruits) Sesquiterpene hydrocarbon, caryophyllene, carbonyl compound (essential oil), lignin d-sesamin, piperine, pipartine and 2 piperidine alkaloids- pipernonaline and piperundecalidine (fruits).

Modern research related to gout

According to a study, piperine significantly inhibited the production of two important pro inflammatory mediators, IL_6 and PGE_2 . The inhibition of PGE_2 production is important due to its central role in triggering pain. A clinical study has been done on *P. longum* roots for its Opioids type analgesic activity using rat tail flick method and for NSAID type analgesic action using acetic acid writhing method. Pentazocine and ibuprofen were used as respective drug controls. It has been seen that *P.*

longum root has weak Opioids but potent NSAID type of analgesic activity by Vedhanayaki G. in 2003.

Haritaki

It has enumerated as best Pathya dravya in Charaka Samhita and has the prime place among medicinal herbs.

Synonyms

Haritaki, Abhaya, Pathya, Kayastha, Putana, Amrita, Haimvati, Avyatha, Chetaki, Shreyasi, Shiva, Vayastha, Vijaya, Jeevani, Rohini, Harad, Chebulic myrobalan.

Gana

Virechnopaga, Kasahara, Jwarahara, Prajasthapana, Vayasthana, Kushthagha. (Charaka), Triphaladi, Amalakyadi, Mustadi, Parushakadi (Su.)

Parts used

Fruit

Distribution

It is found throughout greater parts of India, Burma, Ceylon, up to 6000 ft. in Travancore.⁹

Botanical description

Terminalia chebula is a wonderful herb and is known as long life elixir, part used of which is fruit. It is a medium sized or large tree having egg shaped 10 to 20 cm long leaves and dull white flowers in spikes at the end of its branches. The fruit, which is two- four cm long has five distinct ribs on its body. Drupes, ellipsoidal, ovoid, yellow to orange, brown sometimes tinged with red or black and hard when ripe.

Chemical Constituents

- The fruits of Haritaki contain tannin 45% and a large amount of Gallic acid, mucilage, Chebulinic acid, chebulagic acid and triperpenoic acid.
- Leaves of *T. chebula* are reported to contain Terpenes and Saponins.
- From flowers a purgative glycoside of an Anthraquinone derivative, Chebulin is isolated.
- Sitosterol has been isolated from the bark of *T. chebula*. It contains chebulic acid 35%, chebulinic acid 30%, ellagic acid, gallic acid, resin and some purgative compound of nature of Anthraquinone. (Sharma, T.J. et.al. 2000)

The Pharmacological Action of the Plant

1. Antioxidant activity

Extract and four compounds of *Terminalia chebula* fruit exhibited antioxidant activity at different magnitudes of potency. Fruits also exhibit radio protective activity in rats.

2. Immuno modulatory

Aqueous extract of *Terminalia chebula* produced an increase in humoral antibody titre and delayed type hypersensitivity in mice.

It alleviates Vatadosha due to Madhura and amla rasa, Kaphadosha due to katu, tikta and kashaya rasa, Pitta dosha due to kashaya and Madhura and tikta Rasa. Its fruits are astringent, sweet, acrid, bitter, sour, thermogenic, anodyne, anti-inflammatory, stomachic, laxative, purgative, carminative and digestive, anthelmintic, cardiostonic, aphrodisiac, antiseptic, diuretic and tonic.

Modern Researches Related to Gout

Terminalia chebula is reported to contain hydrolysable tannins such as Chebulin, chebulagic acid, gallic acid that have produced anti-arthritis effect. From the studies, chebulagic acid from immature seeds of *Terminalia chebula* suppressed onset and progression of collagen-induced arthritis in mice. In another clinical study, acetone extracts of fruits of *T. chebula* in doses of 40 and 80 mg/kg did not have any effect on adjuvant induced arthritis whereas 160 and 320 mg/kg showed anti-inflammatory effect as decreased the paw oedema significantly. It also produced a dose dependent anti-inflammatory, anti-arthritis activity which was comparable to dexamethasone treated group.

Vibhitaki

Vernacular Names

Hindi - Bahera;
Telugu - Thanikkaya;
Kannada - Tarekai,
Kashmiri - Babelo,
Malayalam - Tannikka;
Marathi - Baheda;
English - Beleric Myrobalan

Synonyms

Vibhita, Aksa, Aksaka

Gana

Triphala, Mustadi (Sushruta), Jwaraghna Virechnopaga (Charaka)

Part Used

Fruits

Chemical Composition

Chebulagic acid, Ellagic acid (also from bark heartwood) and its ethyl, ester, gallic acid (also from seed coat); fructose, galactose, glucose and its galloyl derivatives, mannitol and rhamnose, B-sitosterol and bellericanin (fruits), protein and oxalic acid (seed); oxalic acid and tannins (bark); palmitic and linoleic acid (kernel and its oil)

Uses

Fruits are astringent, acrid, sweet, thermogenic, anti-inflammatory, anthelmintic, ophthalmic and rejuvenating. They are useful in cough, asthma, insomnia, dyspepsia, flatulence, skin diseases, fevers; they are diuretic and are useful in anaemia and greyness of hair.¹⁰

Amalaki

Vernacular Name

Hindi - Amalaki, Amalak, Amvala, Amla;
Telugu - Usirika;
Kannada - Nellikayi,
Kashmiri - Amla, Embali;
Malayalam - Nellikka;
Marathi - Anvala,
English - Emblic Myrobalan.

Synonyms

Amrtaphala, Amalaka, Dhatriphala

Gana

Triphala, Parushakadi (Sushruta), Vayasthapanna, Virechnopaga. (Charaka)

Part Used

Fruits

Chemical Composition

A good source of vitamin C; carotene, nicotinic acid, riboflavine, D- glucose, D-fructose, myoinositol and a pectin with D-galacturonic acid, D-arabinosyl, D-xylosyl, L-rhamnosyl, D-glucosyl, D-mannosyl and D-galactosyl residues, embicol, mucic, Indole acetic acid, two growth inhibitors – R1 and R2, Phyllembic acid and phyllembin (fruits), tannins, ellagic acid, lupeol, oleanolic aldehyde.

Uses

Paittika vikara, Daha, Paittika Shiroshoola, Mootravarodha, Netraroga, Khalitya, Palitya, Mastishka Daurbalya, Drishti mandya, Aruchi, Trishna, Agnimandya, Vibandha, Amlapitta, Parinamashoola, Udavarta, Udaroroga, Arsha, Hridroga, Raktapitta, Kasa, Shwasa, Yakshma, Kashya, Medhya, Nadibalya, Balya, Rochana, Deepana, Sransana, Hridya, Mootrala, Vrishya, Jwaraghna, Rasayana, Stambhana.¹¹

Mustaka

Latin Name

Cyperus rotundus

Family

Cyperaceae

Vernacular Name

Hindi - Motha, Nagarmotha;

Kannada – Konnari Gadde;

Malayalam - Muthanga, Kari Mustan;

Marathi - Moth, Nagarmoth, Motha,

English - Nut Grass.

Synonyms

Mustaka, Varida

Gana

Triptighna, Trishnanigrahan, Lekhaniya, Kandughna (Ch.)
Mustadi, Vachadi (Su.)

Part used

Tuber

Distribution

It grows throughout India, up to the elevation of 1800 meters, from Kashmir to Shimla, Garhwal, throughout the plains of almost all states.

Chemical Composition

β -sitosterol in rhizome; pinene, cineol, alcohol-isocyperol (essential oil), linoleic acid, linolic, oleic, myristic and stearic acid, glycerol, a sesquiterpene ketone-mustakone and copaene, cyperotundone, cyperolone, cyperonone, α -rotunol, β -rotunol, kobusone and isokobusone, β -selinine Copadiene, cyperol, obusone.

Pharmacological activities

Tranquillizing, antipyretic, anti-inflammatory, diuretic, estrogenic, smooth muscle relaxant, inhibitory activity against {3H} flunitrazepam, binding to benzodiazepine receptor, antimicrobial and juvenile hormone mimicking activity

Modern Research Related to Gout

Anti-pyretic as well as anti-inflammatory action of β -sitosterol, isolated from *Cyperus rotundus* has been studied, engaging

carrageenan persuaded oedema, cotton pellet implantation and Brewer's yeast persuaded pyrexia in rats. β -sitosterol has been shown to possess commanding anti-inflammatory effect alike to hydrocortisone and oxyphenbutazone when given intraperitoneally and possessed antipyretic activity, kindred to acetylsalicylic acid. However, it was without analgesic activity against aconitine persuaded writhing in mice. The extract exhibited high reduction capability and powerful free radical scavenging, especially against 1, 1-diphenyl-2-picrylhydrazyl (DPPH) and superoxide anions as well as a moderate effect on NO. Extract study of *C. rotundus* showed anti-obesity effect and anti-hypertensive action in rats acting both centrally and peripherally altering the peripheral resistance and cardiac mechanics.¹²

DISCUSSION

Different drugs and pharmaceutical procedures consequence into a formulation and potency of which alters with change in qualities of drugs. Before fabricating any formulation, prime importance must be given to the calibration of its constituents. So, to ascertain the qualities of Gokshuradi Guggulu, detail of its ingredients are narrated in this present study. Action of drug is based on 5 mechanisms of actions or attributes; namely rasa, guna, virya and vipaka along with certain specific properties called prabhava. The drugs jointly act as an antagonist to the morbid dosha and dushya and cause 'Samprapti Vighatana'. In the trial drug guggulu is associated with 8 other drugs- Gokshura, Haritaki, Amalaki, Vibhitaki, Pippali, Maricha, Shunthi and Nagarmotha as the main ingredients. Guggulu has been shown to possess the properties of anti-inflammatory¹³⁻¹⁴, antioxidant¹⁵⁻¹⁶, Uricosuric¹⁷, anti-rheumatoidal¹⁸ helps in breaking the pathophysiology of Gout. Gokshura showed better anti-inflammatory results and analgesic action. According to a clinical study, significant analgesic effect of methanolic extract of Gokshura was observed.¹⁹ Triphala works as a Xanthine Oxidase inhibitor²⁰ like Allopurinol which suppresses the production of Uric Acid. Its content Haritaki has antioxidant²¹⁻²² and adaptogenic²³ properties which help in the recovery and healing of deformed tissue. Vibhitaki has been known to show nephro-protective²⁴ action which retards the Urolithiasis and dissolve already formed stones in kidney while Amalaki has anti-inflammatory, analgesic, antipyretic²⁵ and antioxidant²⁶ properties that help in reduction of local as well as systemic inflammatory effects of Gout. Maricha has Antioxidant²⁷, immune-modulatory²⁸ property subsides the hyperactive immune responses precipitated due to Uric Acid. Vasodilatory property²⁹ increases the blood circulation to the affected joint and enhances the process of phagocytosis of antigen-antibody complexes responsible for hypersensitivity which gave rise to inflammation. Piperine found in pippali and Maricha significantly inhibited the production of two important pro inflammatory mediators, IL₆ and PGE₂. The inhibition of PGE₂ production is important due to its central role in triggering pain. It has been shown roots of *P. longum* bear weak Opioids but potent analgesic activity (NSAID type). As per Ayurveda vedana is chiefly manifestation of vata dosha prakopa. Vata due to its sheeta guna exhibits vedana. Most of the drugs in Gokshuradi guggulu are ushna virya which inhibit the sheeta guna of vata thus giving relief of pain. Shunthi is an inhibitor of both prostaglandin and leukotriene biosynthesis³⁰⁻³¹ and its beneficial effects could be, to a large extent, due to these inhibitory effects. It is a potent anti-inflammatory agent and the active principles include squiterpene lactones³². Musta rhizomes are considered as astringent, diaphoretic, diuretic, analgesic, antispasmodic³³, anti-arthritis, anti-inflammatory, antipyretic, analgesic, anti-diabetic, anti-diarrheal, Cytoprotective, anti-mutagenic, antimicrobial, antioxidant and apoptotic.³⁴

CONCLUSION

As per the findings of present review, Gokshuradi Guggulu has all the aspects of Pharmacotherapeutic effect required for the management of Hyperuricemia induced Gout like Anti-inflammatory, Antioxidant, Immuno-modulator, Xanthine Oxidase Inhibitor, Uricosuric and Diuretic effects.

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