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REVIEW ARTICLE

Comprehensive Review of Haridrā and Dāruharidrādi Kaśāya on Diabetic Retinopathy

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ABSTRACT

Ayurveda is being seen as a source of *leads* for discovery of novel molecules. The management of diabetes has been elaborately discussed in Ayurvedic texts. There are number of herbs and herbal preparations that are being used in Ayurveda for the management of diabetes for centuries. Some of these herbs and herbal preparations are also indicated as a treatment of *timira*. We, therefore, considered these herbal preparations as the starting point to carry out our preliminary investigation to get *leads* for the management of diabetic retinopathy.

Keywords: Diabetic retinopathy, Haridra, Daruharidra, Ayurveda, Anti-inflammatory, Antioxidant

INTRODUCTION

Diabetic retinopathy has been one of the foremost causes of blindness in the working age group of both developed and developing countries [1]. In India it is the 6th cause of blindness at present which is increasing day by day [2].Despite this we are not able to fully control the progression of diabetic complications including diabetic retinopathy. Control of blood sugar remains the mainstay of management of diabetes and prevention of diabetic retinopathy. Despite of tight metabolic control of blood glucose, the biochemical events initiated by relative lack of insulin continue to cause damage inretinal tissue especially microvasculature. The biochemical mechanisms primarily include polyol pathway [3], increased AGE formation [4], increased PKC activation [5], oxidative stress [6] and growth factors [7]. Many drugs/molecules are being tried in order to modify the biochemical mechanisms of retinal damage in diabetic retinopathy. There is still a great need to discover new molecules that can counter the pathological mechanisms of diabetes and diabetic retinopathy. A search of novel molecules derived from herbs has been greatly accelerated in recent years. Several experimental studies have already been conducted on the constituent herbs of these preparations that have shown their role on inflammation [8, 9].

DRUG REVIEW

Include extracts of *Haridra* and *Daruharidradi Kashaya*. *Daruharidradi Kashaya* is indicated for treatment of prameha as well as *timira*, and contains *Daruharidra, Deodaru, Mustak, Haritaki, Bibhitaki, Amalaki* as ingredients mixed in equal proportions. Each of the single drugs is reviewed here.

HARIDRA

Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida
Order	Zingiberales
Family	Zingiberaceae
Genus	Curcuma
Species	longa Linn.

Gana:

According to *CharakSamhita haridra* belongs to following Gana:

Kusthaghna, Kandughna, Lekhaniya Vishaghna, Sirovirechan, and Tiktaskandha. According to *SushrutSamhita* it belongs to *Haridrādi, Mustādi, Lākshadi, Vallipanchamula,Vātasanshaman* and *Shlesmaprasādan ganas.*

SYNONYMS

Sanskrit: Haridrā, Nishā, Gauri, Kānchani, Varvarnini, Krimighna, Yushtipriyā,Hatvilashani; **Hindi**: Haldi, Hardi; **English**: Turmeric

HABITAT AND DISTRIBUTION

Its distribution occurs throughout India especially in Bengal, Mumbai, and Tamilnadu.

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MORPHOLOGY

A stem less rhizomatous herb with fleshi rhizome branched with bright orange to yellow within. Leaves are very large, in tufts up to 1.2 maters or more long, including the petiole which is about as long as the blade, oblong-lanceolate, tapering to the base. Flowers in autumnal spikes, 10-15 cm. long; peduncle 15 cm. or more, concealed by the sheathing petiole; flowering bracts pale green; bracts of coma tinged with pink.

PART USED : RHIZOME

RASA PANCHAKA

Rasa	*Tikta, Katu*
Virya	*Ushna*
Vipaka	*Katu*
Guna	*Laghu,Ruksha*
Doshaghnata	*Kaphavatashamaka,Pittarechakashamaka*

CHEMICAL CONSTITUENTS

Rhizome contains a volatile oil 1 percent, an active principle curcumin, and yellow colouring matter and turmeric oil. The crystalline colouring matter curcumin is diferulolyl methane of the formula $C_{21}H_{20}O_6$.

PHARMACOLOGICAL AND CLINICAL STUDIES

Anti-Inflammatory Properties

Curcumin shows an anti-inflammatory effect in acute, sub-acute and chronic models of inflammation in mice and rats. Curcumin inhibits the 5-lipoxygenase activities in rats peritoneal as well as 12, lipoxygenase and the cycloxygenase activity in human platelets. Curcumin also exerts an ecosanoid-modulating property by inhibiting platelet aggregation.[10] The a study conducted on T_2DM male Sprague Dawley rats curcumin showed anti-inflammatory properties as evident by attenuating TNF-α levels in High fat diet fed rats and its anti-lipolytic effect as evident by attenuating plasma free fatty acids.[11]

Anti-inflammatory effects of curcumin are mediated through multiple mechanisms.

Inhibition of the activation of various transcription factors such as Nuclear factor kappa B (NF_kB), Activated protein-1 (AP-1), Peroxisome proliferator-activated receptor-γ (PPAR-γ)[12] Down regulation of the production of pro-inflammatory cytokines such as TNF-α and IL-1β. [13]

Inhibition of prostaglandins and leukotrienes production via inhibition of the activity of cycloxygenase and 5-lipoxygenase enzymes [14] Inhibitor of Lipid peroxidation [15] Inhibitor of Nitric oxide synthase (NOS) overexpression [16]

Antioxidant Activity

The property of curcuminoids in preventing builds up of tissue injuring free radicals. Curcuminoids prevent lipid peroxidation in a significant higher degree than the commonly used antioxidant. Turmeric/curcumin intervene in free radical propagation by quenching pre formed free radicals.[17] Its antioxidant effect has been found in retinal tissue of rats. The study was conducted on the streptozotocin-induced diabetic rats, this study showed that curcumin prevented diabetes-induced decrease in the total antioxidant capacity of the retina and diabetes-induced decrease in retinal GSH was partially inhibited by curcumin administration. In the same rats, curcumin administration had significant beneficial effect on oxidative modification of retinal DNA; 8-OHdG values. Curcumin supplementation in diabetic rats prevented increase in retinal nitrotyrosine levels. From the above action curcumin shows the significant effect on retinal oxidative stress. [18]

IMMUNO STIMULANT ACTIVITY:-

Turmeric has been reported to increase the mitogenic response of splenic lymphocytes in mice. Turmeric rhizomes polysaccharides are shown to stimulate the reticulo-endithelial system. [19]

Anti hyperlipidemic activity:-

Turmeric is known to reduce elevated levels of triglycerides and lipids. Turmeric when feeded to rats shows elevation in the activity of hepatic cholesterol-7 alpha-hydroxylase which is rate-limiting enzyme of bile acid synthesis. This suggests that turmeric can stimulate the conversion of cholesterol to bile acid, an important pathway of elimination of cholesterol from the body. [20]In one study erythrocytes were treated with high levels of glucose. This study demonstrates that the curcumin (1 μM) prevents protein glycosylation as well as curcumin (10 μM) prevented an increase in the lipid peroxidation caused by high glucose concentration. This study also suggests that curcumin may inhibit oxygen radical production caused by high glucose concentration in a cell free system and increases glucose utilization in erythrocytes. This provides evidence for a novel mechanism by which curcumin supplementation may prevent the cellular dysfunction associated with diabetes. [21]

DARUHARIDRA

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Ranunculales
Family	Berberidaceae
Genus	Berberis
Species	Aristata DC

GANA

According to *Charak Samhita daruharidra* belongs to following Gana

Kandughna, Lekhaniya, Arshoghna. According to *Sushrut Samhita* it belongs to *Haridrādi, Mustādi, Lākshādi.*

SYNONYMS:

Sanskrit: *Dārvi, Kantakateri, Kāleyak, Hemakānta, Nishā, Dārunishā, Pitikā*

Hindi: *Daruhaldi* ***English***: *Indian Berbery*

HABITAT ANDDISTRIBUTION:

It is found in the Himalayas within the elevation from 6,000 ft. to 10,000 ft.

MORPHOLOGY

A large deciduous shrub usually 1.8-3.6 meters high. Twigs whitish or pale yellowish brown. Bark pale brown, closely and rather deeply furrowed, rough. Leaves 3.8-10 by 1.5-3.3 cm. obovate or elliptic, entire or spinous toothed, bases gradually narrowed, with prominent reticulate nerves. Inflorescence a simple drooping raceme, 2.5-7.5 cm., long ovoid, blue black with a thick pale bloom, style distinct.

PART USED: Rhizome

RASA PANCHAKA

Rasa	*Tikta, Kasaya*
Virya	*Ushna*
Vipaka	*Katu*
Guna	*Laghu, Ruksha*
Doshaghnata	*KaphapittaharaPittashamaka*

FLOWERING AND FRUITING TIME: Spring to summer seasons.

CHEMICAL CONSTITUENTS

Aristata contains number of alkaloids. Among them the most important alkaloid is berberin to which all the pharmacological activities of the plant is contributed. Other alkaloids present in the plant are berbamine, aromolin, karachine, palmitine, oxyacanthin and oxyberberine.

PHARMACOLOGICAL AND CLINICAL STUDIES

A study conducted on adult male wistar rats induces experimental diabetes mellitus using streptozotocin. It is concluded in the present study that the repeated oral administration of the methanolic extract of Berberis aristata (250 & 500mg/kg) effectively show the hypoglycemic activity and hypolipidemic activity. [22]

ANTIOXIDANT ACTIVITY:

In a study effects of berberine on cultured rabbit corpus cavenosum smooth muscle cell damaged by hydrogen peroxide was studied through examining cell viability by methyl thiazolyl tetrazolium assay, treatment with different concentration of berberine (10-1000 μ mol/L) inhibited the damaging effects of hydrogen peroxide, with increased cell viability, nitric oxide production and superoxide dismutase activity and decreased lactate dehydrogenase release and malondialdehyde content. [23]

ANTI INFLAMMATORYACTIVITY

Berberine inhibits the release of arachidonic acid from cell membrane phospholipids and exerts an effect on arachidonic acid and metabolites. Extract from B.aristata has been shown to inhibit 5-lipoxygenase. Berberine has been shown to reduce the purging effects of castor oil, significantly inhibit drug induced vascular permeability and inhibits drug induced swelling in a dose dependent manner.[24]

ACTIONS & USES:

Extract made from root-bark used in skin diseases, menorrhagia, diarrhea, jaundice and eyes affections. The decoction of root bark is given in malarial fever. The roots are useful for healing ulcers, ophthalmia, jaundice, fevers.

DEVADARU

Kingdom	Plantae
Division	Coniferophyta
Class	Pinopsida
Order	Pinales
Family	Pinacae
Genus	Cedrus
Species	Deodara Roxb.

GANA:

According to *Charak Samhitadevadaru* belongs to following *GanaStanyashodhan, Anuvasanopaga, Katukaskandha* According to *Sushrut Samhita* it belongs to *Elādi,Vachādi, Vātasanshaman, Vachādi*

SYNONYMS:

Sanskrit: *Bhadradāru, Surabhuruha, Indraruksha, Sneharuksha, Devakastha, Pitādru, Surada*

Hindi: Debdar, Devdar, Deodar ***English***: Deodar

HABITAT AND DISTRIBUTION:

It is found in North-Western Himalaya, eastward to Kumaon, from 5,500 ft. to 12,000ft. Elevation Afghanistan.

MORPHOLOGY

A large evergreen tree; branches not whorled, the leading shoot and tips of the branches usually drooping;bark dark; sometimes almost black; usually very rough on old stems; sometimes only lightly furrowed. Leaves 2.5-3.3 cm. long, needle-like, triquetrous, sharp-pointed. Flowers usually monoeceous, but some trees or branches habitually bear flowers of one sex.

PART USED: Heartwood Oil

RASA PANCHAKA

Rasa	*Tikta, Katu*
Virya	*Ushna*
Vipaka	*Katu*
Guna	*Laghu, Snigdha*
Doshaghnata	*Kaphavatashamak*

FLOWERING AND FRUITING TIME: Rains to autumn season.

CHEMICAL CONSTITUENTS:

Wood oil contains oleo-resin, essential oil and needles (leaves) contain ascorbic acid.

PHARMACOLOGICAL AND CLINICAL STUDIES:

ANTI-INFLAMMATORY PROPERTIES:-

A study conducted on the compound 48/80 and nystatin-induced rat paw edema. It was concluded in the study that the *Cedrus deodara* wood oil (50 and 100 mg/kg) significantly inhibited the edema induced by compound 48/80 is suggestive of its probable mast cell stabilization activity. Inhibition of nystatin-induced edema suggests a possible stabilizing action on lysosomal membranes and inhibition of prostaglandins synthesis. These results confirm the already reported anti-inflammatory activity of *Cedrus deodara*.[25] In the study conducted on the carrageenan-induced rat paw edema, it is concluded that the oral administration of *Cedrus deodara* wood oil (50-100 mg/kg), Significantly inhibited the carrageenan-induced inflammation in rats could be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis. Cedrus deodara wood oil has been found to have potential anti-inflammatory activity against both exudative proliferative and chronic phases of inflammation. [26]

ACTIONS & USES:

The bark is astringent and useful for fevers, diarrhoea and dysentery. It is also an antidote to snake bite. It is also an ingredient in many formulations indicated for *prameha and timira*. [27, 28]

MUSTA

Kingdom	Plantae
Division	Magnoliophyta
Class	liliopsida
Order	poales
Family	cyperaceae
Genus	Cyperus
Species	rotundus Linn.

GANA

According to *Charak Samhita musta* belongs to following Gana*Stanyashodhan, Truptighna, Kandughna, Lekhan, Trushnānigrahaniya*.

According to *Sushrut Samhita* it belongs to*Mustādi, Vachādi*.

SYNONYMS:

Sanskrit: *Vārida, Jalada, Ambuda, Shishirā, Kalapini, Meghā, Jimuta*

Hindi : *Motha, Nāgarmotha* ***English***: Nut grass

HABITAT AND DISTRIBUTION:

Herb is very common in almost every sort of terrestrial habitats. Plants occur throughout India in aquatic wet and moist places up to 6, 000ft. altitude.

MORPHOLOGY

It is perennial shrub that attains a height of ½ to 2 feet it has a thin stem that is of dark green in color. Leaves are long having 1/6 to 1/3 inch broad and are sharp. The flowers are present in the racemes presentation. Flowers are 2 to 8 inch in length. The nodes on the stem are thick that bears ½ inch diameter, oval shape rhizomes. It is aromatic and is white in color from inside and brown from outside. The plant flowers in summers and fruits in winters.

PART USED: Kanda

RASA PANCHAKA

Rasa	*Tikta, Katu, Kasaya*
Virya	*Sita*
Vipaka	*Katu*
Guna	*Laghu, Ruksha*
Doshaghnata	*Kaphapittashamak*

FLOWERING AND FRUITING TIME: Summer untile autumn

CHEMICAL CONSTITUENTS:

It rhizome of it contains an aromatic oil that is 0.5 to 0.6 %. There is also present a stable oil. Besides this it contains certain alkaloids, minerals and vitamins. The ash contains calcium, phosphorus, sodium and some carbonates.

PHARMACOLOGICAL AND CLINICAL STUDIES:

ADVANCED GLYCATION END PRODUCTS:-

In the present study, the inhibitory activity of hydro alcoholic extract of *Cyperous rotundus* was evaluated in vitro using a model of fructose-mediated protein glycooxidation. Since, the formation of AGEs products is facilitated under oxidative reaction. *Cyperous rotundus* could inhibit AGEs formation by decreasing the ROS formation or by scavenging the ROS formed in vitro by autoxidation of sugars and /or oxidative degradation of Amadori products. [29]

ANTI-OXIDANT:-

Cyperous rotundus is a powerful anti-oxidant with suppressing effect on AGE formation.[30] It has been found in a study conducted on alloxan induced hyperglycemia in rats. The antihyperglycemic activity can be attributed to antioxidant activity of hydro-ethanolic extract of cyperous rotundus (500 mg/kg of the extract).[31]Antioxidant activity of *Cyperus rotundus* rhizomes extract (CRRE) was evaluated in a series of *in vitro* assay involving free radicals and reactive oxygen species and IC50 values were determined. The results obtained in the study indicate that *C. rotundus* rhizomes extract can be a potential source of natural antioxidant. [32]

ANTI INFLAMMATORY ACTIVITY

Cyperousrotundus exhibited anti inflammatory effects on number of models of inflammation. *Cyperousrotundus* inhibits prostaglandin synthesis and the effect is considered due to the presence of sesquiterpenes in the plant. [33]

ACTIONS & USES:

It is used as anthelmintic, antipoisonous, astringent, carminative, diuretic, and expectorant. It heals wounds and ulcers and cures abdominal pain. It is also have effect on *prameha and timira*. [34]

HARITAKI

Kingdom	*Plantae*
Divison	*Magnoliophyta*
Class	*Magnoliopsida*
Order	*Myrtales*
Family	*Combretaceae*
Genus	*Terminalia*
Species	*chebulaRetz.*

GANA

According to *Charak Samhita haritaki* belongs to following *GanaKustaghna, Kāsaghna,Arshoghna*
According to *Sushrut Samhita* it belongs to *Triphala, Amalakadi, Mustadi, Vachadi, Mushkadi, Parushakadi*

SYNONYMS

Sanskrit: *Abhayā, Pathyā, Shivā, Kāyastha,Rasāyanphala, Bhishakpriyā.*
Hindi :Harara, Harad ***English***:Chebulic myrobalan.

HABITAT AND DISTRIBUTION:

It is found throughout greater part of India, up to 5000 ft. in outer Himalaya and up to 6000 ft. in Travancore.
Morphology:
A moderate sized to large deciduous tree with a cylindrical bole, rounded crown and spreading branches, leaves ovate, elliptic or obovate glabrous to tawny-villous beneath with a pair of large glands at the top of petiole**. Flowers** yellowish white in terminal, simple or short panicles**. Fruits** glabrous, shining, ellipsoidal, obovoid or ovoid drupes, yellow to orange brown in colour and 3.75 cm long. **Seeds** are hard and pale yellow.

PART USED: Mature and immature fruits.

RASA PANCHAKA

Rasa	*Pancharasa (Lavana varjita, Kashaya pradhan*)
Virya	*Ushna*
Vipaka	*Madhura*
Guna	*Laghu, Ruksha*
Doshaghnata	*Tridosh-hara.*

FLOWERING AND FRUITING TIME: Rains to summer season.

CHEMICAL CONSTITUENTS

Fruit contain tannin 30%. In tannin mainly chebulinic acid, tannic acid, gallic acid, corilagin, palmitic,
stearic, oleic, linoleic, arachidic acid are present.

THERAPEUTIC USES

The fruit is the prominent herbal drug which is a highly valuable, comman and widely used medicine in Indian systems of medicine.
Prameha**:** *Haritaki* decreases the *mutraadhikya* lakshan of *prameha* by *dravakaph* and *kled shoshan.* Due to the *Dipan-Pachan gunas* of *Haritaki* the *dushtmedpachan* and *medagni dipan* is done due to that the the *medshaithilya*is decreases**.**
Netraroga**:***Haritaki* increases the *netra bala, Chakshushya,* use the *Haritaki* or *Triphala* in *vata-kapha or kaphaj netrarog, the ruksha, ushana and madhurvipak* of *Haritaki* respectively done the *mamsa*, *meda* and *majjagat mala pachan-shodhan* after that increases the *netra bala*. Out of the four *patalas* of *netra*, the *Timir*

vyadhi is formed in *second mamsaashrit patala*. The shodhan of this *patal* is done by the *Haritaki* so that in *Timir Haritaki or Triphala* are bestdrugs.

Action and Uses:
Fruits are astringent, anti-inflammatory, laxative, purgative, digestive, cardiotonic, antiseptic, diuretic and tonic. Useful in vitiated conditions of *tridosha*, wounds, ulcers, inflammations, neuropathy and general debility.
A decoction of fruit is good astringent wash. External use in *vataj vedna, granthi, sopham*. *Triphala kashaya* is surgical dressing for *Ropana.*

PHARMACOLOGICAL AND CLINICAL STUDIES:

ADVANCED GLYCATION ENDPRODUCTS:[35]

It has been found in a study,the protective mechanism of chebulic acidagainst vascular endothelial dysfunction human umbilical vein endothelial cells (HUVEC) were treated with chebulic acid in the presence/absence of glyceraldehyde-related AGEs (glycer-AGEs). The aqueous extract of Terminalia chebular fruits (chebulic acid) reduces the AGE induced cytotoxicity. Reducing the AGE-induced Reactive Oxygen Species [ROS] formation. Reducing the AGE- induced reductions in endothelial cell electrical resistance. Reducing the AGE-induced monocyte adhesion

ANTIOXIDANT PROPERTY: [36]

Terminalia chebula was tested for potential antioxidant activity by examine its ability to inhibitγ –radiation induced lipid peroxidation in rat liver microsomes. It protects the antioxidant enzymes from the reactive oxygen species produced by γ-radiation. It has been concluded in this study that the actual mechanism of protection may be due to direct scavenging of the free radicals produced during irradiation by the active constituent of the aqueous axtract of Terminalia chebula

VIBHITAKA

Kingdom	*Plantae*
Division	*Magnoliophyta*
Class	*Magnoliopsida*
Order	*Myrtales*
Family	*Combretaceae*
Genus	*Terminalia*
Species	*bellerica Roxb.*

GANA

According to *Charak Samhita haridra* belongs to following *Gana Jwaraghna, Virechanopagh.*

According to *Sushrut Samhita* it belongs to*Triphala, Mustādi, Mshkādi*.

SYNONYMS

Sanskrit:*Aksha, Bahuviryā, Bhutavāsa, Kalidruma, Kashaghna.*
Hindi:*Bahera, Behara*.
English:*Belliric*myrobalan.

HABITAT AND DISTRIBUTION

It is found throughout India in deciduous forests up to an elevation of 900m.

MORPHOLOGY:

It is a large deciduous tree 20-30 m. in height with thick brownish grey bark having shallow longitudinal fissures**. Leaves** simple, alternate, long-petiolated, crowded around the extremities of branches, broadly elliptic, margins entire, main nerves 6-8 pairs, midrib prominent on both surfaces, **Flowers** pale greenish yellow with an offensive odour, an axillary spikes, longer than the petioles but shorter than the leaves, **Fruits** ovoid grey drupes, obscurely 5-angled, narrowed into a very short stalk.

PART USED: Fruit, Bark.

RASAPANCHAKA

Rasa	*Kashaya*
Virya	*Ushna*
Vipaka	*Madhura*
Guna	*Laghu, Ruksha.*
Doshaghnata	*Tridoshhara.*

CHEMICAL CONSTITUENTS:

β -Sitosterol, gallic acid, ellagic acid, ethyl gallate, galloyl glucose and chebulagic acid are isolated from fruits.

ACTION & USES:

Fruit is bitter, pungent, acrid, digestible, laxative, antihelminthic, useful in bronchitis, sore throat, biliousness, and inflammations. *'Kernel'* is narcotic and astringent, used as an application to inflamed parts.

PHARMACOLOGICAL AND CLINICAL STUDIES:

ANTIOXIDANT PROPERTY

In rats- oxidative stress produced by alloxon was found to be significantly lowered by the administration of *Terminalia belerica* extract. This was evident from a significant decrease in thiobarbituric acid reactive substances, conjugated dienes and hydroperoxides in blood and liver respectively.[37]
Results of the study revealed that methanol extracts from the fruits of T. bellerica (TB)

exhibits good antioxidant and free radical scavenging activity.[38]

The present study was carried out to isolate and identify the putative antidiabetic compound from the fruit rind of T. bellerica and assess its chemico-biological interaction in experimental diabetic rat models. Oral administration of GA (20 mg/kg bw) significantly decreased serum total cholesterol, triglyceride, LDL-cholesterol, urea, uric acid, creatinine and at the same time markedly increased plasma insulin, C-peptide and glucose tolerance level.[39]

AMALAKI

Kingdom	*Plantae*
Divison	*Magnoliophyta*
Class	*Magnoliopsida*
Order	*Malpighales*
Family	*Euphorbiaceae*
Genus	*Emblica*
Species	*officinalisGaertn.*

GANA

According to *Charak Samhita haridra* belongs to following *Gana Vayasthāpan, Virechanopaga*

According to *Sushrut Samhita* it belongs to*Triphāla, Parushakādi, Amalakādi, mushkādi, Mustādi*

SYNONYMS

Sanskrit:*Dhātri, Shriphala, Amrutā, Shivā, Rochani, Divyā, Dhātriphalā* ***Hindi*** :Amlika, Amalak, Anwala. ***English***: Emblic myrobalan, Indian gooseberry.

HABITAT AND DISTRIBUTION

It is found throughout India in deciduous forests and on hill slopes up to 900 m., especially in Bengal and Tamilnadu.

MORPHOLOGY

A moderate sized to large deciduous tree with a cylindrical bole, rounded crown and spreading branches, **Leaves** ovate, obovate glabrous to tawny-villous beneath with a pair of large glands at the top of petiole. **Flowers** yellowish white in terminal, simple and short pedicles, **Fruits** glabrous, shining, ellipsoidal, obovoid or ovoid drupes, yellow to orange brown in colour, **Seeds** are hard and pale yellow in colour.

PART USED: Fruit

RASA PANCHAKA

Rasa	*Pancharasa(Lavanavarjita, amlapradhana)*
Virya	*Sheeta.*
Vipaka	*Madhura.*
Guna	*Guru, Ruksha, Sheeta.*
Doshaghnata	*Tridosh-hara.*

CHEMICAL CONSTITUENTS

The fruits, leaves and bark are rich in tannins.Chromatographical studies of extracts of its dried fruits shows tannin and colloidal complexes, phyllemic acid being chief constituent, 6% lipids, 5% gallic acid. Fruit pericarp is rich in Ascorbic acid. EmblicaninA& Emblicanin B present in fruit improve the efficiency of Vitamin C in reducingdihydroascorbic acid to ascorbic acid.

PHARMACOLOGICALACTIVITIES

IMMUNOMODULATORY EFFECTS:-

Emblica officinalis is significantly beneficial in stimulating immune system. It enhances natural killer cell activity and anti body dependent cellular activity. There are several reports regarding the immune stimulatory effects of ascorbic acid. As *Emblica officinalis* is considered the richest source of Vitamin C, it is thought that the immuno modulatory effects of *Emblicao fficinalis* is mediated by the ascorbic acid present in it.

EO was assessed for its immuno modulatory activity in adjuvant inducedarthritic (AIA) rat model. Complete Freund's adjuvant (CFA) was injected in righthind paw of the animals induced inflammation. Lymphocyte proliferation activity and histopathological severity of synovial hyperplasia were used to study the anti-inflammatory response of the extracts. The extract showed a marked reduction in inflammation and edema and caused immuno suppression in AIA rats[40]

ANTI OXIDANT ACTIVITY:-

In the study, the alloxan diabetic rats were examined for the antioxidant properties of Amla extracts and its effects on the oxidative stress in streptozotocin-induced diabetes were also reported. The extract showed strong free radical scavenging activity, improved the levels of Albumin and the serum Adiponectin.[41]

This study was aimed to investigate the antioxidant property of *Emblica officinalis* duringrestrain-stress in albino rat. The oxidative stress was assessed by measuring the lipid peroxidation (LPO), enzymatic antioxidant status peroxide dismutase (SOD). *Emblica officinalis (*500mg/kg body weight for 30 days) significantly prevents the restrain-stress-induced oxidative stress and elevation in LPO and corticosterone levels and this may due to its strong antioxidant property. [42] The use of amala as an antioxidant has been examined by a number of authors

[Bhattacharya; Chaudhuri]. Experiments conducted at the Niwa Institute of Immunology in Japan have shown *Amala* to be a potent scavenger of free radicals. The studies showed that *Amala* preparations contained high levels of the free-radical scavenger, superoxide dimutase (SOD), in the experimental subjects [Tread way].

ANTI-INFLAMMATORY

P. emblica L. has been used for anti-inflammatory and antipyretic treatments by rural populations in its growing areas [Burkill 1966].

Uses of *Emblica officinalis* in Diabetes:

Oral administration of the extracts (100 mg/kg body weight) reduced the blood sugar level in normal and in alloxan (120 mg/kg) diabetic rats. EO and an enriched fraction of its tannoids are effective in delaying development of diabetic cataract in rats. Aldose reductase (AR) has its involvement in the and development of secondary complications of diabetes. EO is proved as an important inhibitor of AR. [43]

ACTIONS & USES:

Kusthaghna, Krimighna, Rasayan, Dahaprashamana, Raktashodaka. Fruits are sour, astringent, bitter, acrid, cooling, opthalmic, digestive, carminative, antipyretic and tonic. Useful in vitiated conditon of *tridoshas*.

TRIPHALA

In India for thousands of years the *Triphala* has been used as an Ayurvedic medicine for a number of (chronic) maladies. This is a formulation having three fruits mixed in equal parts. The three fruits are *Amalaki* or Emblica officinalis or the Indian gooseberry, *Haritaki* or Terminalia chebula and *Bibhitaki* or Terminalia belerica (collectively called the myrobalans). Cenetarians using the *Triphala* have deemed its benefits as the reason for their longevity.

According to a popular folk saying in India just as a mother cares for her child so too does the *Triphala* takes care of the internal organs of the body. The three fruits (often taken in powdered form) take gentle but wholesome care of the body.

THE *TRIPHALA* CONSTITUENTS

Triphala contains bioflavonoids, high vitamin C content, linoleic oil and phospholipids. It has a high nutritional level. The ancient Ayurvedic treatise *Charak* Samhita considers *Triphala* as a '*rasayan'* meaning a formulation that prevents aging and promotes longevity. Amla and *haritaki* are especially known for promoting an overall rejuvenation of the body and delaying the aging process

CONCLUSION

Dominance of herbal drugs in practice of Ayurveda is palpably visible since centuries.According to Ayurveda the pathogenesis of prameha involves tridoshas (*vata*, *pitta* and *kapha*) but mainly it is the *kaphapradhanvyadhi*, 10 *dushyasmeda, mamsa, kleda, shukra, shonit, vasa, majja, lasika, rasa,* Oja (*meda dustipradhanta*). '*Haridra* and *Daruharidradi Kasyaya* Extract' contains seven drugs namely *Haridra, Daruharidra, Devadaru, Mustak, Haritaki, Bibhitaki, Amalaki.* From Ayurvedic point of view the effect of drugs can be explained on the basis of *rasa, virya, vipak, guna, doshaghnata* and*gana*. The metabolic disorder created by diabetes affects the target tissue by multiple mechanisms. The multiple molecules of extract of haridra and daruharidradi kashaya might have worked one more than one target to produce the favorable outcome.

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