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Sida cordifolia (Linn) – An overview

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ABSTRACT

Our world is fulfilled by various medicinal plants which are widely have been used in treatment of various diseases since ancient time. Medicinal plants still play an important role in emerging and developing countries. They also generate income to people of many Asian countries who can earn their livelihood from selling collected materials from the forest or by cultivating on their farms. Thus the medicinal plants constitute very important rational resources. In India plants have been trditionally used for human and veterinary health care needs. This reflects that medicinal plant and their products have taken an increasing demand. Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although herbs had been priced for their medicinal, flavoring and aromatic qualities. Malvaceae, commonly known as *Bala*, is an Ayurvedic medicine that is used to treat bronchial asthma, cold and flu, chills, lack of perspiration, head ache, nasal congestion, aching joints and bones, cough and wheezing, and edema. The root infusion is given in nervous and urinary diseases and also in disorders of the blood and bile. *Sida cordifolia* has been reported to posess analgesic, anti-inflammatory and hypoglycemic activities as well as hepatoprotective activity. Traditionally the plant *Sida cordifolia* (linn) syn has been used as CNS depressant, fat lose, analgesics, anti-inflammatory, hypotensive, hepatoprotectiv. Presence of ephedrine has highlighted the utility of this plant .various ayurvadic preparation of this plant used in asthma diseases, fat lose and increase energy, Oil preparation is also cure pain, swelling disorder, and Gritha cures Heart diseases. This plant has great potential to develop the Ayurvedic, modern medicine and athletic supplements by pharmaceutical industries. The present review is highlights the traditional uses, Ayurvedic preparation, chemical constituents and pharmacological properties of *Sida cordifolia* (linn) syn. Country Mallow.

Key words: *Sida cordifolia*, Ephedrine, Ayurveda, weight loss, analgesic.

INTRODUCTION

An impressive number of thousands of plants have been utilizing for treatment of diseases since thousands of years. Many of them are fairly introduced in our Indian traditional medicines "Ayurveda "(corell et al., 2000). According to the world health organization, herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary health care. This plant-based traditional medicinal system continues to play an essential role in health care. *Sida corifolia* (linn) syn. Country Mallow of Malvaceae family is widely distributed along with other species are common throughout the tropical and sub tropical plains all over India and Srilanka up to an altitude of 1050 m., growing wild along the roadside. It grows as wasteland weed. It is also known as the "Bala" in Hindi and Sanskrit. (Narayan et al., 1956) The plant name Bala is coined on the name of 'Parvati' (goddess of strength and beauty). The quantities are low, with less than 2% of ephedrine and pseudoephedrine found in the leaves of *Sida cordifolia*. Ephedrine is known to stimulate the central nervous system (CNS), and as such can enhance weight loss. Traditionally nutrition companies used plants such as *Ma-Huang* (Ephedra plant), because it contained relatively large amounts of ephedrine, in their weight loss products. However, since this product was banned in many countries including the USA and UK, they are now looking for alternatives. *Sida cordifolia*, with its ephedrine and pseudoephedrine has gained a lot of interest and is now sold by many of these companies (Ghosal et al., 1975).

Sida cordifolia is a small, erect, downy shrub. The leaves of the plant are chordate-oblong or ovate- oblong and fruits with a pair of awns on each carpel. Roots of the plant which constitute a drug are 5-15 cm long with few lateral roots of smaller size. The tap roots are generally branched at the tip. The outer surface of the root is off to grayish yellow. It is almost odourless with slightly bitter taste (Rangari et al., 1995). The present review highlights the contribution of *Sida cordifolia* in modern system of herbal medicine for new drug development. There is correlation established between the active constituents and their uses in different diseases. Some Ayurvedic preparation and supplement of plant available in market are also mention.

Botanical description

Sida cordifolia grows well through the plains of India, especially, in damp climates. The shrub grows up to 0.75 – 1.5 meters in height. The root and the stem are stout and strong. The leaves are 2.5-7 cm long and 2.5-5 cm broad, with 7-9 veins. They are heart shaped, serrate and truncate. The flowers are small, yellow or white in colour, solitary and axillaries. The fruits are moong-sized, 6-8 mm in diameter. The seeds are called as Bijabanda in Ayurveda, are grayish black in colour and smooth. The plant flowers from August to December and fruiting occurs from October to January (Pole et al., 2006).

Vernacular names

- Hindi - Kungyi
- English - Country mallow
- Sanskrit - Bala
- Tamil - Mayir-manikham
- Bengali - Brela
- Guajarati - Junglimethi
- Malayalam - Velluram
- Punjab - Simak
- maharastra - Chikana

Scientific Classification

- Kingdom - Plantae
- Division - Angiospermae
- Class - Eudicots
- Order - Malvales
- Family - Malvaceae
- Genus - Sida
- Species - *Sida cordifolia*

Regional names: Bariar, Batyalaka, Beejband, Bijband, Brela, Chikana, Chiribenda, Chitimutti, Hettuti-gida, Janglimethi, Kharenti, Khareti, Kisangi, Kungyi, Mayir-manikham, Muttuva, Paniyar-tutti, Simak, Tupkaria, Tutturabenda and Velluram.

Occurrence & Distribution

Country Mallow of Malvaceae family is widely distributed along with other species are common throughout the tropical and sub tropical plains all over India and Srilanka up to an altitude of 1050 m., growing wild along the roadside.

Part Used: seed, leaves, Roots

Macroscopic Characters

Stems - stout and strong
Leaves - 2.5-7 cm long and 2.5-5 cm broad, with 7-9 veins.
Flowers - small, yellow or white in colour, solitary and axillaries.
Fruits - moong-sized, 6-8 mm in diameter
Seeds - grayish black in colour and smooth.

Chemical constituents

- Ephedrine.
- Pseudoephedrine
- Sterculic, malvalic and coronaric acid.
- Fatty acids.
- Saponine.
- Betaphenethylamine.
- Hypaphorine.
- Ecdysterone.
- Indole alkaloides.
- Palmitic, stearic and β – sitosterol.

See Table 2 for chemical constituent in detail.

Therapeutic Uses

The Plant is alternative tonic, astringent, emollient, aphrodisiac etc.

- Bark - Considered as cooling. It is useful in blood, throat, urinary system related troubles, piles, phthisis, insanity etc.
- Seeds- The seeds as considered as aphoradisiac.
- Roots -It is regarded as cooling, astringment, stomachic and tonic, aromatic, bitter, diuretic.

***Sida cordifolia* physiological effect**

- It has a depressant rather than a stimulant effect on the Central Nervous System
- May decrease both blood pressure and heart rate
- Has a hypoglycemic (blood sugar lowering effect)
- No real evidence to support its use as a weight loss supplement
- Increases pain tolerance
- Has an anti-inflammatory effect
- Possible antioxidant effect

Side effects

Sida cordifolia when used excessively can cause ephedrine related side effects like insomnia, anxiety, nervousness, and increase in blood pressure, memory loss or even stroke.

Ephedrine coupled with caffeine can prove fatal. Patients subjected to IOC drug testing, using MAO inhibitor medication (Anti-depressants), having high blood pressure, heart disease, thyroid or prostrate condition along with pregnant or lactating women should not take this herb except under expert guidance.

Traditional uses

It has a long history of use by Ayurveda and rural area particularly for medicinal properties. It is in use as folk medicine in India since time immemorial. According to Ayurveda, the plant is tonic, astringent, emollient, aphrodisiac and useful in treatment of respiratory system related troubles. Bark is considered as cooling. It is useful in blood, throat, urinary system related troubles, piles, phthisis, insanity etc. (Agharkar et al., 1991).

The plant is analgesic, anti-inflammatory and tonic. It affects the central nervous system and provides relief from anxiety. Its extract is consumed to reduce body weight. It tones the blood pressure and improves the cardiac irregularity. It is also useful in fever, fits, Ophthalmic, rheumatism, colic and nervous disorders. It has also been reported to improve sexual strength. *Sida cordifolia* oils are used topically to the sore muscles and sore joints in rheumatism and arthritis with the crushed leaves can be carried out a cataplasm to alleviate local pains and because of its astringent value for the cure of external wounds or imperfections of the skin. The bronchodilator value of the vasicinone, vasicine and vasicinol are used to elaborate preparations for the treatment of the bronchial affections, especially in what refers to the cough, asthma, bronchitis, nasal congestion, flu, pain in the chest, etc. Decoction of the root of bala and ginger is given in intermittent fever attended with cold shivering fits. Root juice is also used to promote healing of wounds. Powder of the root and bark together, is given with milk and sugar for frequent micturition. Oil prepared from the decoction of root bark mixed with milk and sesame oil, finds application in diseases of the nervous system, and is very efficacious in curing facial paralysis and sciatica (koman et al., 1921). According to Ayurveda 'Bala' balance all the doshas – vata, pitta, kapha. It has more effect on vata dosha. Leaves are cooked and eaten in cases of bleeding piles. Juice of the whole plant, pounded with a little water is given in doses of ¼ seers for spermatorrohea, rheumatism, and gonorrhoea. Made into paste with juice of palmyra tree, it is applied locally, in elephantiasis (Yogaratnakaram).

PHARMACOLOGICAL ACTIVITIES

CNS depressant: Franco et al tested that rather than being a stimulant, *Sida cordifolia* actually acts as a depressant and decreases CNS activity. He tested the hydro alcoholic extract of *Sida cordifolia* at a dose of 1000 mg/kg (i.p. and p.o.) produced sedation, decrease of the ambulation, reduction of answer to the touch, analgesia and decrease of urination same dose caused significant reduction ($p < 0.001$) of the spontaneous locomotors activity in comparison with the control group at 30 and 60 min as well as did not cause a significant difference in the motor coordination of the treated animals in comparison with the control group. He also noticed that the hydro alcoholic extract of *S. cordifolia* at a dose of 1000 mg/kg (i.p. or p.o.) did not produce a significant alteration of the latency and the time of sleep of the reacted animals in comparison with those from control group. (Franco et al., 2005) Medeiros et al, Additional research appears to confirm that *Sida cordifolia* does not stimulate the CNS (Mediros et al., 2005).

Fat lose

Medeiros et al studied, the oral consumption of *S.cordifolia* by rats actually caused a decrease in both heart rate and blood pressure. If it was having a stimulatory effect we would see both heart rate and blood pressure increase. Since *S.cordifolia* fails to increase CNS activity, as claimed by some companies, it cannot promote fat loss through CNS stimulation. (Mediros et al., 2005), However safeties of *S.cordifolia* extract will be always objectionable on basis of:

1. Appetite suppression and cardiovascular effects as these are associated with ephedrine.
2. The only support of *Sida cordifolia* as a weight loss product is through its hypoglycemic (blood sugar lowering) activity. Research studies have shown that it possesses a significant blood-sugar lowering activity and therefore may help to reduce the storage of fat with fat cells (Kanth et al., 1999).

Today numbers of companies are promoting *Sida cordifolia* for anti-obesity effect. Experts are of the opinion that anti-obesity effect is not limited to ephedrine content; other constituents may play a synergistic role. Further chemical analysis reveals that seasonal variation of alkaloids in *S.cordifolia* less as compared to Ephedra sp. *S.cordifolia*, thus may be useful substitute to Ephedra sp.

Analgesic and anti-inflammatory

Kanth and Diwan also demonstrated that *S. cordifolia* can increase pain tolerance and appears to have anti-inflammatory properties. (Kanth et al., 1999) When rats were exposed to heat, rats that consumed *Sida cordifolia* had a greater heat tolerance. It may be effective as an antioxidant (Auddy et al., 2003). Diwan and Kulkarni studied anti-inflammatory activity of ethyl acetate and alcohol extracts of *S.cordifolia* was studied in rats .The percent inhibition of oedema was calculated with reference to the control group. The aerial part exhibited significant anti-inflammatory activity only at a dose level of 600 mg/kg. Both *Sida cordifolia* aerial and root extract showed dose dependent activity (Diwan et al., 1983).

V Ravi Kant tested Acetic acid induced writhing test method on Analgesic activities. The number of writhing episodes of eight groups of six animals were compared with those of aspirin. At a 600 mg/kg dose both *S. cordifolia* root and aerial extract exhibited significantly ($p < 0.001$) better activity than that elicited by aspirin. He also evaluated the latency time for licking of legs and jumping responses after exposure on the hot plate surface. The

Table 1: Phytoconstituents of different parts of "*Sida cordifolia*" plant with % alkaloids

Plant parts	Phytoconstituents	Alkaloids percents
Whole parts (include leaves , stems ,seeds and roots)	Large amount of ephedrine	Extend of 0.085 %
Seeds	Sterculic, malvalic and coronaric acid along with other fatty acids.	0.32 %
Leaves	Ephedrine , pseudoephedrine	0.28 %
Stems	Ephedrine	0.22 %
Roots	Ephedrine, saponine, choline pseudoephedrine, betaphenethylamine, vasicine, hypaphorine, ecdysterone and related indole alkaloides.	0.06 %
Aerial parts	Ephedrine , pseudoephedrine , Palmitic ,stearic and β – sitosterol , hexacosanoic acids, 6-phenyl ethyl amine, carboxylated tryptomines, qunazoline, hypaphorine, vasicinol	0.31 %

increase of latency time in relation to the control was taken as an index of analgesic activity (Kanth et al., 1999).

Hypotensive

Medeiros et al performed the aqueous fraction of hydro alcoholic extract of *S. cordifolia* induced hypotension and bradycardia on mean arterial pressure and heart rate in non-anaesthetized rat.(Eddy et al ., 1953) Administration of atropine completely abolish the Aqueous fraction of hydro alcoholic extract of *S.cordifolia* induced hypotensive and bradycardic responses. Administration of hexamethonium potentiates significantly the hypotensive response and significantly attenuate bradycardic response. The administration of hexamethonium+l-NAME significantly attenuates the same extraction induced hypotensive response, but did not affect the bradycardic response (Mediros et al., 2005).

Hepatoprotective

Fumaric acid isolated from *S.cordifolia* was reported to be hepatoprotective (Kumar et al., 1997). Recent works has reported hepatoprotective effect of aqueous extract of *S. cordifolia* after partial hepatectomy (Silva et al., 2006).

Silva investigated that Sida *cordifolia* stimulates insulin release by pancreatic â cells, acting like sulphonylureas. Knowing that insulin acts as an important co-mitogen it can be raised the hypothesis that the augmented release of this hormone, stimulated by *Sida cordifolia,* can exert a permissive role in the hepatocellular synthesis of DNA and, consequently, in liver regeneration process.(silva et al ., 2008)

Anti microbial activity

Mahesh et al reported that *S. cordifolia* leaf extract showed highest antibacterial activity against *F. verticillioides* .The methanol leaf extracts of tested by disc diffusion method (Mahesh et al., 2008).

Adaptogenic activity

Plant adaptogen are smooth prostressors which reduce the reactivity of host defense system. The mode of action of adaptogens is basically associated with stress system. Adaptogen increase the capacity of stress to respond to the external signals of activating and deactivating mediators of stress response subsequently. The stress induced increase in total WBC count is decreased by SCE, indicating adaptogenic activity (Sumanth Meera.et al., 2009).

Anti Parkinson's disease

Parkinson's disease Ayurveda treatment aims at balancing disturbed vata. Massage therapy, enema, medication methods are applied. In addition to Mucuna pruriens (known by names violet bean, cowhage, naikkurana and kaunch beej), Ashwaganda (Withania somnifera), Sida cordifolia are the prime herbs usable in Parkinson's disease Ayurvedic treatment. (Dev seri et al., 2008)

Wound healing activity

Jaiswal studied that plant used in wound healing activity.tissue healing is an important prosses which is the basis of various surgical manipulation it can be inhanced by several herbal medicine. (Jaiswal et al., 2004) Plants and their extracts have immense potential for the management of different types of wounds. The phyto-medicines for wound healing are not only cheap and affordable but are also purportedly safe. However, there is a need for scientific validation, standardization and safety evaluation of plant of the traditional medicine before these could be recommended for healing of the wounds. Pharmacological screening of botanicals is necessary for viewing new chemical entities in normal subjects, which is designed to search for novel drug actions at an early stage of drug development.

Anti Hypertriglyceridemic activity

The antihypertriglyceridemic potential of *S. rhomboidea. Roxb* leaf extract mediated via decreased intestinal absorption and increased catabolism of TG. Pharmacological evidence for use of sida leaf extract as a folklore medicine for controlling obesity amongst north-eastern population of Indian subcontinent.

Hypoglycemic activity

Sida cordifolia use as a weight loss product is through its hypoglycaemic (blood sugar lowering) activity. Research studies have shown that it possesses a significant blood-sugar lowering activity and therefore may help to reduce the storage of fat with fat cells. (Chopra et al., 1956)

Anti –oxidant activity

Dhalwal *et al* studied that all extracts of *Sida cordifolia.* (SC) have effective reducing power and free-radical scavenging activity. Only the root extract exhibited superoxide-scavenging activity and inhibited lipid peroxidation in rat liver homogenate. All these antioxidant properties were concentration dependent. The highest antioxidant activity was observed in the root extract. (Dhalwal et al., 1983).

Other uses: The roots of *S.cardifolia* have been reported to possess astringent, diuretic and tonic properties. The drug has also demonstrated antibacterial, antiplaque and antifungal activities.

***SIDA CORDIFOLIA* EPHEDRINE ACTIVITY**

Sida cordifolia leaves contain small quantities of both ephedrine and pseudoephidrine. However, the quantities are low, with less than 2% of ephedrine and pseudoephedrine found in the leaves of *Sida cordifolia.* Ephedrine is known to stimulate the central nervous system (CNS), and as such can enhance weight loss. Traditionally nutrition companies used plants such as *Ma-Huang* (Ephedra plant), because it contained relatively large amounts of ephedrine, in their weight loss products. Ephedrine, a 2-aminophenylpropane alkaloid was first isolated from *Ephedra sinica* Stapf. (Ma-Huang). *Ephedra gerardiana.* Wall. ex Stapf is widely used in Ayurvedic system of medicine.

Ephedrine is a potent bronchodilator. Another alkaloid reported form Ephedra sp is pseudoephederine which seems to be present in lower concentrations in *Sida cordifolia.* Ephedrine and nor ephedrine suppresses the appetite resulting in weight loss. Other alkaloids like norpseudoephedrine are less potent as compared to ephedrine and norephedrine (also known as phenylpropanolamine) and can cause serous ill effects. Therapy with nor ephedrine has been linked with stroke in young age group. Food drug administration has restricted the use of nor-ephedrine in States. Here it is not worthwhile to mention that nor is ephedrine used in common cold preparations also. (Ghosal et al., 1975)

Structure of Ephedrine

Ephedrine content of *Sida cordifolia* is less as compared to *Ephedra sinica*. This suggests feeble analeptic and central nervous system stimulating effects of Sida cordifolia. However *Sida cordifolia* contains other bronchodilator alkaloids like vasicinone, vasicine and vasicinol which are absent in *Ephedra sinica*. In terms of presence of alkaloids like vasicinone, vasicine and vasicinol, Sida cordifolia resembles with *Adhatoda vasica* Nees. N.O.: Acanthaceae. Ayurvedic formulations containing *Sida cordifolia* should not be prescribed with cardiac glycosides, monoamine oxidase inhibitors and ergot alkaloids (Chopra et al., 1982). Although no drug interactions have been reported with *Sida cordifolia* preparations but owing to great variation of active constituent, great care should be taken while prescribing *Sida cordifolia* with cardiac glycosides (can cause disturbance of heart rhythm), monoamine oxidase inhibitors (as it can potentate the symapthomimetic activity) and ergot alkaloids (can cause hypertension).

Although little data is available on active constituent of *Sida cordifolia* but according to one study a minute dose of *Sida cordifolia* given intravenously, causes a sharp and well marked rise of blood pressure in anaesthetized or decerebrated animals which is maintained for some time. This pharmacological activity of *Sida cordifolia* resembles with ephedrine. According to Mark Blumenthal effects of ephedrine should not be confused with *Ephedra sinica*. This is a typical example of difference in pharmacological activities of whole herb and isolated constituents. Similar concept applies when we compare Sida *cordifolia* with ephedrine. (Singh et al., 2006)

AYURVEDIC PREPARATIONS

In Ayurvedic texts, bala is from a group of four herbs alacatustay. Maharsi Caraka has categorized bala as brmhaniya , a bulk promoting herb and as balya tonic and prajasthapana which promotes reproduction. Acarya Vagbhata and Susruta have cited it as vata samsamana pacifies the vata dosa., Caraka has also mentioned it as a rejuvenative (rasayana) to muscle tissue (mamsa dhatu) and muscular system (mamsavaha srotasa) (Caraka Samhita)

Externally used preparation

Externall, the medicated oil of bala, Bala siddha taila, is massaged to alleviate pain and swelling in vata disorders. The paste of its leaves is applied in ophthalmic diseases and for wound dressing. In children, the famous oil preparation of bala – Candan bala laksadi taila is used for massage in muscular weakness.

Internally used preparation

Internally, bala is the best nervine tonic and rasayana for all kinds of vata disorders. It is also rejuvenative, nutritive and stimulant to the heart. As a milk decoction with sugar, it is a good nutritive and aphrodisiac. It also promites healing of tissue in chronic infectious diseases. In particular, it is highly recommended in extensive tuberculosis with cavitation. For that the decoction of its roots works well, when given with ghee and honey. It promotes the heling of lung tissue and curbs the cavitation. Bala is a valuable blood purifier helpful in raktapitta and piles. It is especially anabolic to muscle tissue and augments the seminal fluids, and promotes reproduction. As it helps building the muscle tissue, it boosts the strength and hence, imparts a rejuvenative action. As a tonic, it is commonly used in general debility. In menorrhagia it is salutary as it is styptic as well as blood purifier. It also boosts the foetal growth. Bala mula siddha dugdha- the medicated milk of

Table 2:- List of Chemical Constituents

S.N	Chemical constituents	Inference	References
1.	Tannins	Absent	Koman.et al., 1921
2.	Mucins	Present	Koman.et al., 1921
3.	potassium nitrate	Present	Koman.et al., 1921
4.	Resins	Present	Koman.et al., 1921
5.	resins acid	Present	Koman.et al., 1921
6.	Proteins	Present (74,000ppm to 347,000ppm)	Available on www.fao.org
7.	Carbohydrate	Present (94,000ppm to 475,000ppm)	Available on www.fao.org
8.	Fiber	Present 33,000ppm to 167,000ppm	Available on www.fao.org
9.	Fat	Present 14,000ppm to 71,000ppm	Rangari VD et al., 1999
10	Flavones (5, 7-dihydroxy-3-isoprenyl flavones, 5-hydroxy-3-isoprenyl flavones)	Present	Ranajit K et al., 1982
12	Essential oils	Present	Ghosal et al., 1975
13	Alkaloids: ephedrine, pseudoephedrine, vasicinone, vasicine and vasicinol	Present	Ghosal et al., 1975

bala heals the ulcers and wounds of urinary tract, alleviate bleeding in urine and relieves dysuria. In vata disorders like paralysis, facial palsy, cervical spondylosis etc. Bala works well as a nervine tonic. N such conditions, the decoction of its roots given orally and bala siddha taila – its mediacted oil is used for massage. Bala oil can be used orally, externally for massage and for giving enema (basti) also. The fresh juice of whole plant is recommended for raktapitta bleeding disorders, along with the milk and rock candy (ayurvedic.com).

Classical Ayurvedic Preparations

- Bala taila
- Satapakiksirabala
- Bala curna / swarasa
- Baladya ghrta
- Baladyarista
- Baladi kvatha

Candana balalaksadi taila

Externall, the medicated oil of bala, Bala siddha taila, is massaged to alleviate pain and swelling in vata disorders. In children, the famous oil preparation of bala, Candan bala laksadi taila is used for massage in muscular weakness. Bala mula siddha dugdha- the medicated milk of bala heals the ulcers and wounds of urinary tract, alleviate bleeding in urine and relieves dysuria (www.herbcureindia.com). The popular Mahanarayana taila, Balati taila, Prabhanjana Vimardhana, Ksheera-bala taila contain this herb. The oils are used topically to massage the sore muscles, sore joints in arthritis and rheumatism, in sciatica and neuritis of legs. Another oil called *Dhanvantari tailam* (21 and 101 times boiled) which contains Bala along with 47 other substances, Baladhyam Gritham, Yakshmani. This gritha is given for the following diseases: fever, T.B, bronchitis, headache, and migraine. *Chakrapani Datta* recommended that this gritha can be consumed by adding two parts of milk to it (Koman et al 1921).

Baladhyam Gritham, Urakshathe

This Gritha cures Heart diseases, colic, bronchitis and vata-pitta doshas. Ayurvedic formulations containing *Sida cordifolia* should not be prescribed with cardiac glycosides, monoamine oxidase inhibitors (Dawson et al., 1995).

Supplements of *S. cordifolia*: These are the strongest *Sida cordifolia* health supplement currently on the market:-

1) *Sida Cordifolia* 400 mg of a 4:1 Extract (1600 mg) 60 Capsules-1-2 capsules per day can help you to take advantage of the many health benefits provided by the *Sida Cordifolia* herb:-
- may enable super-charged workout
- may help fat burning and weight.
-may increase energy, concentration and focus.
- may provide respiratory relief from asthma and bronchitis.
- may provide Joint pain anti-inflammatory relief.

2) Garnell *sida cordifolia* – 90 vegicaps
3) Cnp *sida cordifolia* 120 tablets
4) Reflex *Sida cordifolia* complex

Sida cordifolia complex is a herbal complex designed to trigger fast fat loss. It contains precise ratio of sida cordifolia (10% alkaloids) Gurana (22% caffeine) and white willow bark (20% salicin) to trigger thermogenesis (fat loss).

5) *Sida cordifolia* slimming pills.
6) Chocolate banana *sida cordifolia* 1600mg.
7) *Sida Cordifolia* 120 Tablets CNP Nutritional Supplements.

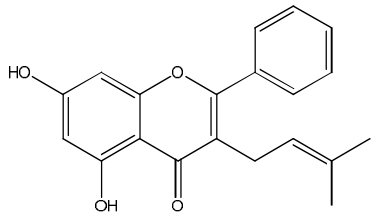

Fig. 1:- 5, 7-dihydroxy-3-isoprenyl flavones.

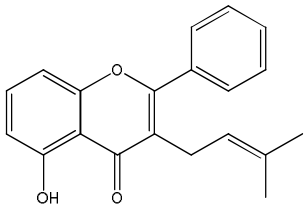

Fig. 2:- 5-hydroxy-3-isoprenyl flavones.

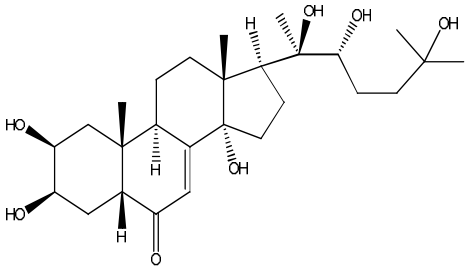

Fig. 3:- Structure of Ecdysterone.

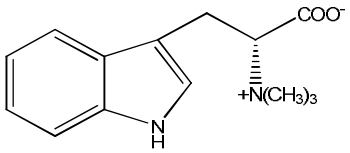

Fig. 4:- Structure of hypaphorine

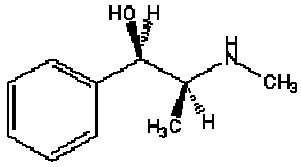

Fig 5:- Structure of ephedrine

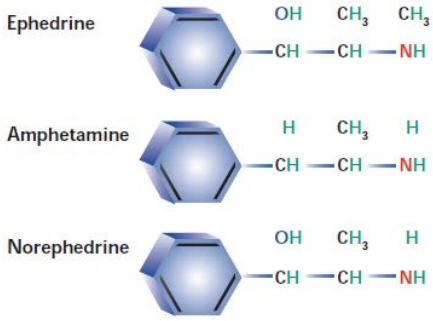

Fig 6:- Ephedrine Derivatives

8) Evolution *sida cordifolia* (400 mg capsules)
9) Hydroslim effervescent slimming tablets (tablets)

Marketed preparation:

- Baladhyam Gritham –

  Yakshmani Bala swadhamstra brihati kalasi dhavani sthira. Nimbhaha parpatakam mustham trayamanam dhuralaba.

  Krithva kashayam peshyardham dhadya dhamalakim satim. Dhrksha pushkaramulastcha medha mamalakanicha.

  Gritham payascha tharsidham sarpi jawaraharam param. Kshaya kasa prasamanam sirah parswa rujapaham.

- According to Ayurveda 'Bala' balances all the doshas – vata, pitta, kapha. It has more effect on vata dosha.
  Valatitikta madhura pittatisaranasani
  Valaviryaprada pustikapharogavisodhani
  - Typical preparations and dosage of *bala* / *sida cordifloia* Suggested Dosage:

1.Bala fair trade Powder –Take 1/2 to 2 grams per day, use mixed with milk or fruit juice. (Can be split up over day) 2.*Bala* / *Sida cordifolia* Fair trade Tincture – Extraction Ratio 1:3 Alcohol vol. 25% 5-10ml daily (can be split up into 2-3 doses per day) or as directed by an herbal practitioner.

CONCLUSION

S.cordifolia is widely used for its medicinal applications. Presence of ephedrine has highlighted the utility of the plant.

However it is too early to say about benefit of the plant in treating obesity as negligible data has accumulated in term of its efficacy. Further the plant has hypoglycemic and appetite suppressant activity. Animal experiments however report hepatoprotectiv effect of *S.cordifolia.*

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