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A REVIEW ON NUTRACEUTICAL ASPECT OF ALABU

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ABSTRACT

Sedentary lifestyle has increases risk of cardiovascular diseases. Food and nutrient plays important role in prevention of this diseases.Ayurveda has emphasized importance of food in management of diseases and has given detail description of it in "*Ahara varga*". In present era, even modern practitioner has also realized the importance of dietary items, in form of nutraceuticals elements. Lagenaria siceraria of Cucurbitaceae family is one of nutraceuticals elements, due to the dietary principles exist in it. It *Madhura* variety (*Alabu)* acts as S*antarpana* and *Rasayana* and the *Katu* variety (*Katu-alabu*) do the *Aampachana* and *Strotas shodhana* and act as "*Hridya"* due to which it helps to cure and prevent many cardiovascular diseases. The components like cucurbitacin, lagenin has cardioprotective, antioxidant, antihyperlipidemic activities. The present article aimed to focus on all its medical as well as nutritive property so that it can be seen more as nutraceutical item rather just than dietary vegetables, and to develop interest of researchers regarding its various therapeutic aspects.

KEYWORDS: *Alabu*, Nutraceuticals, *Madhura-Tikta-Katu Rasa, Hridya.*

1] INTRODUCTION

Cardiovascular disorders are common, morbid condition worldwide. The risk factors for this are smoking, physical inactivity and dietary factors. Food and nutrients play a vital role in maintaining health and reducing risk of various disease.In Ayurveda, a special importance is given to *Ahara* i.e food in treatment as well as prevention of diseases. *Ahara* is mentioned as one of the ***"trividha upastambha***" i.e *Ahara, Nindra* and *Bramhacharya*. Many food items which includes vegetables, tubers, seeds etc contain not on minerals, vitamins and fibres but also have tremendous medicinal values. This is termed as "*Ahara-Ausadhi*" in Ayurvedic sciences. A list of such "*Ahara-Ausadhi*" is mentioned under the termed "*Ahara Varga*" in different Ayurvedic texts. *Acharayas* has mentioned *Pathya-Apathy*a i.e do's and don't for every disease and according to them, while treating a disease if this *Pathya-Apathya* are not followed properly will lead to future complications. According to Ayurveda, this term "*Pathya-Apathya*" have such great potential that if they are followed properly can cure disease with least medicines. This *Pathya-Apathya* generally includes which food items to eat and what to avoid in specific disease and, in specific seasons and climatic conditions. This revealed that the important of food is being established in the Ayurvedic science since ancient time.

In recent years a term called ""Nutraceuticals" is gaining popularity in modern science. This term "Nutraceuticals" means a group of products that are more than food but less than pharmaceuticals. These nutraceuticals co-related with the ayurvedic term "*Ahara-Ausadhi*". In most countries along with India nutraceuticals are taken as part of dietary supplements. Nutraceuticals provide both health benefits to reduce the risk of chronic diseases and basic nutrition. The nutraceuticals with the potential to modify the plasma lipid profile, reduces atherosclerosis process and reduces the risk of cardiovascular disesses. The difference between medicinal plants and nutraceuticals is that, a primary characteristic of nutraceuticals is that, they have a nutritional role in the diet and the benefits to health may arise from long-term use as foods. In contrast, many medicinal plants exert specific medicinal actions without serving a nutritional role in human diet.[1]

Presently, Cucurbitaceous plants are famous as nutraceuticals as they show remarkable therapeutic properties. Several important vegetables such as cucumber, pumpkins, and bottle gourd belong to Cucurbitaceae family. *Lagenaria siceraria* (Molina) Standely syn. L.*leucantha* Rusby; L. Vulgaris Ser, commonly known as bottle gourd or *Lauk*i with bottle, oval or dumbbell shaped fruit. The fruit of Lagenaria siceraria are widely used for medicinal and nutritional

purpose. It has two varieties, one is sweet type which form major part of diet in India. It is called "*Gramya alabu*", it has *Madhura rasa and vipaka*. The variety is of bitter type called as "*Vanya alabu*" which has *Katu and Tikta rasa and Katu vipaka* and is generally use for medical purpose. The dried fruit of *alabu* is used for *Raktamokshana* therapy in Ayurveda. The fruit is reported to have good source of Vitamin B complex and choline along with fair source of vitamin- c and beta carotene. It also possesses important pharmacological activities like anti-oxidants, antihyperlipidemic, cardioprotective etc. In view of the immense medicinal importance of the plant, the present article emphasized to compile all the essential information on its phytochemical, biological and pharmacological properties to create interest among researchers regarding its immense potential.[2]

2] Classification

Kingdom	Plantae
Phylum	Magnoliophyta
Class	Magnoliopsida
Order	Cucurbitales
Family	Cucurbiticeae
Genus	Coccinia
Subfamily	Papilionoideae
Number of Species	27

3] Ayurvedic Classification

CHARAK, VAGBHATA: - Vaman dravya
ADARSH NIGHANTU: - Kushmandadi Varga
RAJ NIGHANTU: - Mulakadi Varga, Guduchayadi Varga
DHANVANTARI NIGHANTU: - Guduchayadi Varga
BHAVPRAKASH NIGHANTU: - Shak Varga
PRIYAVATA NIGHANTU: - Shak Varga
KAIYDEV NIGHANTU: - Aushadhi Varga

4] Synonyms(*Prariyay)*

- Sanskrit

Ishvaku- It produces "*ikshu*" shound when it is cut.
Katutumbi- It is Katu(bitter) in taste.
Alabu:- Its fruit is heavy and big in size so it need support as it is not able to hang to its climber.
Mahaphala: - Its fruit is very big in size
Tiktabeeja: - Its seed are having *Tikta rasa*

- BENGALI- Laus, Loki
- ENGLISH- Bottle gourd
- GUJRATI- Dudi, Tumbadi
- HINDI- Lauki, Ghia
- MALYALAM- Chorakka, Churan, Choraikka, Piccura, Tumburini
- MARATHI- Phopla
- TAMIL- Shorakkai, Surai, Suraikkai
- TELGU- Sorakaya, Anapakaya.

5] MORPHOLOGY

Lagenaria siceraria is a vine species, which is an annual, diploid, pubescent climbing herb.Plants can grow upto 5m long and are shallow rooted with an extensive lateral root system.
LEAVES- leaves are simple (i.e lobed or unlobed but not seperated by leaflets)
alternate phyllotaxy, there is one leaf per node along the stem.
the edges of the leaf blade has teeth and lobes.
STEM: - Stems are softly pubescent with jointed, gland-tipped hairs.
FLOWERS- flowers are radially symmetrical, monoecious, where solitary male and female flower are found on different plant axis of same plant,white- yellow in colour.
there are 5 petals and sepals, 3 stamens. Petals are fused into cupe or tube.
FRUIT- 30-60cm long, bottle or club shaped, external surface smooth and fleshy, pale green in colour, hard and dry when ripe.
ROOTS- they are white to pale cream, smmoth and circular in cross section.The tap root can penetrate down upto 80cm, but the bulk of the root system spread out and inhabits the topsoil.[3]

6] Distribution

It is probably native to tropical Africa but now has a pantropical distribution across America, West Indies, Asia and on many islands in Pacific and Indian Ocean.[4]

7] Cutivation

Lagenaria Siceraria is cultivated widely in tropical and subtropical areas at elevation ranging from 2500m above sea level. It can tolerate dry and arid condition thus can be found in arid steppes and deserts. It can also be found growing in flat areas, rocky ridges, woodland, alluvial sandy soils.[5]

8] Literature Review

8.1] Bhavprakash

Two varieties are mentioned in *Shak varga*, both having same Latin name- Lageneria vulgaris Ser. And belong to family Cucurbiticeae.

i. *ALABU* – Also called as *Tumbi (lauki)*

This type is generally used for cooking purpose and is called as white gourd

Two types of *Aluba* are mentioned as per size

a) *Drigha alabu* – long sized
b) *Vartula alabu* – rounded

Alabu is guru, ruchikara, viryavardhaka, hriyda, pitta-kapha nashaka, and dhatupushtikar.

ii. ***Katutumbi*****: -** This is *vanyabheda* and the fruit is bitter in taste thus is used for medicinal purpose.

It is called as Bitter gourd and have synonyms – *Ishvaku, Katutumbi, Mahaphala.*

Katutumbi is having Tikta rasa, katu vipaka and have shital and hridya guna. They are useful in *pitta, kasa, visha and vatta-pittaj jwara*.[6]

8.2] Dhanvantari Nighantu

He has mentioned *Katukalambuni in Guduchaydi varga* having synonyms- *Tumbi, Pindaphala, Shatriyavara, Tiktabheeja.*

It is having *katu-tikta rasa, vatavardhaka, swasa-kasahara, sodhana* properties and is useful in *shotha, vrana, shula, swasa-kasa, visha*.

The other variety is big in size and is having *guru, ruksha and atishital guna.*[7]

8.3] Raj Nighantu

He has mentioned *Katutumbi in Guduchyadi varga* and *Kumbhatumbi, Bhutumbi* and *Shirkumbhi in Mulakadi Varga*.

i. ***Katutumbi***

Its Latin name is Lageneria vulgaris and is called Bitter gourd in English.

Synonyms are – *Tumbini, Bruhatphala, Rajputri, Katuphala*.

It has *katu rasa, ushna virya, and have vamankarak, vataroga, swasaroga nashak, malashodhak, vrana-shotha-shula nashaka properties.*

ii. ***Kumbhatumbi***

It is called as '*gola-lauki'*

Seven synonyms are given- *Gorakshi, Gorakshatumbi, Navalabu, Ambughanta, Kumbhalabu, Ghantalubu, kumbhatumbi.*

It is madhura, shital, pittanashak, santrapaniya, ruchikar, viryapushti and balapradkar.

iii. Shirkumbhi

It is called as '*lambi-lauki'*

15 synonyms are given- *shirkumbhi, Dhudhakumbhi, drighavrutaphala, Ishvaku, Shatriyavara, Drighabheja, Mahaphala, Shirini, Dhudhabheeja, Dhudhadhanta, Payasvini, Mahabala, Alabu, Shramighni.*

It has *Madhura rasa, snigdha guna, and is pittanashaka, garbhaposhaka, viryavridhikara, vatakara and bala-pushtikara*

iv. ***Bhutumbi***

Six synonyms are given- *Bhutumbi, Nagatumbi, Shakrachap-samudbhav, valamikasambhava, Devi, Divyatumbi.*

It is katu rasatamak, ushnaviryayi, sannipataharini, and is used in dhanurvata(tetanus), Dhantagral, Dhantavrodha.[8]

8.4] Kaiydev Nighantu

Two varieties are mentioned – *rajalabu and katutumbi*, both having Latin name – Lageneria vulgaris

i. Rajalabu

It is called as *'lauki'*

Synonyms – *Shakalaubu, tumbi etc*

Gunakarma of its leaves, fruit and stalk is given

a) *Lauki phala* (fruit)

Shital, ruksha, vrushya, vishtambhakara, vatavardhaka, madhura rasa and vipaka, malabhedaka, guru, kapha-pittahara.

b) *Lauki shaka*(vegetable)
Guru, kaphavardhaka, vishanashaka, kriminashaka, shramahara, grahi, shital and reduces mukha-vishadata.

c) *Lauki dantala* (stalk)
Guru, madhura, snigdha, shitvirya, pittanashaka, vata-kaphavardhaka, malabhedaka.

d) *Lauki patra* (leaves)
Madhura, pittanashak, mutra-shodhak.

ii. Katutumbi
It is called as '*kadavi lauki'*
Synonyms- *Dhudhika, pindaphala, pravara* etc.
It is *titka rasatamaka, katuvipaki, has vamak, vata-pittanashak, aruchikara, shital* properties. And is useful in *swasa, kasa, jwara and visha*.[9]

8.5] Charaka
Mentioned as *Ikshvaku in Kalpa Sthana* chapter third.
Synonyms- *Katualabu, tumbi*
Total *45 kalpas of Alabu* are mentioned.
Use of seeds in form of "*Ikshvaku Vardhaman yoga*" where total 100 seeds are used. *Charaka* has adviced to start consuming 50 seeds and then gradually increase 10 seeds per day upto 100 seeds.
Use of *Ikshvaku majja* along with buttermilk in *Pandu, Kustha and Vishvikara*.
Use of seed powder along with goat milk for *Gulma, Udara, Shlipada, Gandmala.*[10]

9] Traditional Uses
The fruits, leaves, seeds and oil are edible and are used by local peoples in treating various disorders like ulcer, piles, hypertension, jaundice and skin diseases. The flowers are used as antidote in poison. The fruit pulp is used as sedative, purgative, diuretic. The seeds are vermifuge. Leaf juice along with sesame oil is widely used for baldness. The fruit pulp is boiled in oil and is used for insomnia and rheumatism. The tribal communities located in Telangana zone use the dry hard shell of fruit for domestic utensils like bottles, bowls etc. In khammam district dried shells are used to make wind musical instruments and pipes.The Gutti koya tribals use the bottle guard as a cure for headache for external application by mixing iseed oil with castor oil [11]

10] Rasa-Panchak

RASA	*1.ALABU (GRAMYA BHEDA)-MADHURA* *2.KATUTUMBI (VANYA BHEDA)-KATU, TITKA*
VIRYA	*SHITA(R.N- BHUTUMBI-USHNA VIRYA)*
VIPAKA	*ALABU- MADHURA* *KATUTUMBI- KATU*
GUNA	*RUKSHA, GURU, SHITAL*
DOSHAGHANTA	*KAPA-PITTA SHAMAK* *VATA VARDHAK*

11] Chemical Composition

FRUIT	Choline, Cucurbitacins, Isovitexin, Saponatin, C glycosides
LEAVES	Sterols, Flavonoids, Polyphenolics, Saponin
SEEDS	Lagenin, saponin
STEM	D:C -friedooleanane
ROOT	Bryonolic acid, Triterpens [12]

12] Useful Part
1.Patra (leaves)
2. Phala (fruit)
3. Beeja (seeds)
4.Pushpa (flowers)

13] Dose
10-20Ml of fresh juice of fruit.

14] Formulation: - Mahavishagarbha taila

15] Karma
1.Vrushya
2. Vishaghna
3. Swasa-kasahara
4.Jwarahara
5. Chardihara
6. Bruhaniya
7.Dhatupushtikar
8. Ruchikara
9. Malabhedaka
10. Vishtambhakara

16] Pharmacological Actions
1.Hepatoprotective
2. Cardioprotective
3.Antistress
4. Antihyperlipidemic
5. Antioxidant
6. Anti hyperglycemic
7. Antihyperlipidemic
8. Immunomodulatory

17] Microscopic Study
The transverse section of Lagenaria siceraria leaf showed upper epidermis consists of elongated parenchymatous cells, covered by cuticle. The upper epidermis shows few stomata, which are of anisocytic type. Lower epidermis contains elongated wavy walled parenchymatous cells covered by cuticle. Number of covering and collapsed trichomes as well as very few glandular trichomes are also present. The upper and lower epidermis consist of palisade cells. Mesophyll is made up of 3-4 layered chloroplasts which contains compactly arranged, oval to circular cells. It is interrupted by vascular bundles of various size. Vascular bundles are surrounded by 2-3layere sclerenchyma, they are conjoint, collateral and closed. Xylem is placed towards upper epidermis and phloem towards lower epidermis. [13]

18] Identity, Purity and Strength

Foreign matter	Not more than	Nil %	Appendix 2.2.2
Total ash	Not more than	12%	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.6%	Appendix 2.2.4
Alcohol-soluble extraction	Not more than	10%	Appendix 2.2.6
Water-soluble Extraction	Not more than	25%	Appendix 2.2.7

19] T.L.C

T.L.C of the alcoholic extract on Silica gel 'G 'plate using Toluene: Ethyl acetate (85:15) shows under UV(366nm) three fluorescent zones at Rf.0.13(light blue), 0.66(pink) and 0.88(light pink). On exposure to iodine vapour three spots appear at Rf 0.13, 0.33 and 0.57(yellow). On spraying with 5% Methanolic - Sulphuric acid reagent and heating the plate for ten minutes at 110℃ two spots appear at Rf0.13 and 0.57(both light brown).[14]

20] Nutrient Components of Fruits of Lagenaria Siceraria (Per100g Of Edible Portion) [15]

Nutrient components	Value
Proteins	0.2
Fat	0.1
Carbohydrates	2.5
Fibres	0.6
Calcium	120
Magnesium	5
Iron	0.7
Vitamin -A	60
Thiamine	0.03
Riboflavin	0.01
Nicotinic acid	0.2
Vitamin-C	5
Oxalic acid	27
Sodium	1.8
Potassium	87

21] Mode of Action

Alabu is mentioned as "*Hridya*" in Ayurveda due to which it possesses the pharmacological activities like cardioprotective, anti-hyper lipidemic, anti-oxidant etc.

The *karya-karan mimansa* of this drug as "*Hridya*" is due to its *rasa-guna-virya-vipaka.*

Madhura Alabu consists of *madhura rasa and vipaka, shita virya and guru-shita guna*, due to which it does *santrapana of rasa dhatu* and ultimately all the other *dhatus. The hridaya(heart*) has its *utapatti from rasa dhatu and as rasa dhatu* is forming in *prakruta awastha lead to swatha awastha of hridaya* (healthy heart). It also does *rasayana karya.* The *Rasayana* property ultimately lead to increase the immune system and do prevention of various diseases.

Katu Alabu has Katu-Tikta rasa, Katu vipaka, and Ruksha guna due to which it does *Aampachana* and remove *strotas avarodha* caused by *aam sanchiti*. It also does *rasa dhatu pachana*. Due to all this it reduces *hridya-jadhyata* (heaviness in heart) and act as *hridya.*

22] Phamacological Action

Cardioprotective activity

Lagenaria siceraria fruit powder shows cardioprotective activity in Wistar albino rats. L.S prevents the alteration in endogenous antioxidants and lipid peroxidation whereas markers of cardiotoxicity i.e CK-MB, LDH were significantly reduced.[16]

Antihyperlipidemic activity

The chloroform and the alcoholic extract of fruit exhibits significant anti hyper lipidemic activity in triton induced hyper lipidemic rats. They inhibit the total cholesterol, triglycerides, low density lipoproteins level and increased the high-density lipoproteins.[17]

Antioxidant activity

The antioxidant effect of fresh and dried fruit of L.siceraria was evaluated by comparing the DPPH radical scavenging and reducing capacity of ethyl acetate and n-butanol extracts of fresh and dried fruit. The results show that the fruit of Lagenaria siceraria are potetinal source of antioxidants.[18]

DICUSSION

Bottle gourd *(Alabu*) is still underutilized fruit in spite of being one of the source of nutrition and therapeutic uses. At present, due to sedentary lifestyle like cardiovascular diseases, obesity etc are increasing day by day. The basic line of treatment for this is not just giving medication but is to do improvement is our diet by including food items which have both medicinal as well as dietary properties. The *Katu-Tikta and Madhura rasa, Katu- Madhura vipaka, Ruksha guna, Hridya karma* helps to reduce obesity, decrease the LDH, triglycerides which all helps to prevent the cardiovascular diseases. It is good source of vitamin B complex and choline along with the fair amounts of vitamin C which make it a very important dietary supplement. Thus appropriate steps should be taken in the research field regarding this nutritionally important fruit.

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