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## Pharmacological traditional and health benefits of bottle gourd: A review

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#### Abstract

This paper is represented in a way to enhance the traditional uses and benefits of human health. Bottle gourd (*Lagenaria siceraria*) of family Cucurbitaceae. It is perennial climbing plant which is widely grown as vegetable crop in countries of tropical regions such as Japan, India & Thailand. The climber since from ancient times known for its Therapeutic properties that include piles, diabetes jaundice, ulcer, hypertension, colitis, cardiac failure and properties which has been used for various complications also for the cure of skin diseases. The pulp of fruit is known for its cooling, diuretic, laxative and pectoral properties. By boiling the pulp of this fruit in oil has the benefits to cure conditions like insomnia and arthritis. Compounds like flavonoids, saponins, have been isolated from species. Besides the fruit extracts has been found to contain various phytochemical activities.

**Keywords:** Pharmacological traditional, health benefits, bottle gourd

#### Introduction

Bottle gourd is also known as a calabash (*Lagenaria siceraria*) It belongs to gourd family Cucurbitaceae and is a running or climbing vine. The fruit is harvested young. It has light green color with smooth skin and a white inner flesh. White flowered gourd, long melon, New Guinea bean and Tasmania bean (Decker-walters, 2004) [7]. These fruits have variety of shapes they can be rounded, small and bottle shaped, or slim and they can be grown to be a meter long. Rounder varieties are known as calabash gourds. The gourds are one of world's first cultivated plants grown not primarily for food, but can be used as containers, utensil and also in musical instruments. These gourds are known to be originated from Asia to Africa, Europe to Americans due to the migration of human beings and through the seeds floating across the oceans inside the gourd (Yeti sir 2008) It has also been proven to be existed in new world prior to arrival of Christopher Columbus. The bottle gourd has been recovered from archaeological contexts in China and Japan during (8,000-9,000) B.P. But in Africa after high research record remains the 1884 report of bottle gourd being recovered from 12th Dynasty dating to (4,000) Bephenium considering genetic and archaeological information together it is known to be brought independently under domestication first in Asia, then in Africa more than 4,000 years later. The gourd is commonly cultivated in tropical and subtropical areas of world, and domesticated in southern Africa. Stands of Sicarii, which may be source plants and not merely considered domesticated stands, were reported in Zimbabwe in 2004. Walahfrid Strabo (808-849), abbot and poet from Richenda and advisor to Carolingian kings, discussed gourd in his Fonticulus as one of 23 plants of ideal garden. The bottle gourd was known to be as drifted across Atlantic Ocean from Africa to South America, but in 2005 a group of researchers suggested that it may have been domesticated earlier than food crops and livestock. Paleo-Indians, which they based on study of genetics and archaeological samples reported that gourds in American archaeological research were more related to Asian variants than African ones. In 2014 researchers undergone more through genetic study on various genomes of bottle gourd sample, and concluded that North and South American specimen were closely related to African variants and could have come across the ocean long 10,000 years ago. Genus Cucurbita include different kinds of gourds like pumpkins squashes Out of these the gourd which is probably ornamental is most extensively grown gourd in United States. The different variety of fruits originate in this gourd makes it amusing to humans' eye. The gourd belongs to genus *Lagenaria* which is derived from the word *lagena* meaning bottle (Milind and Satbir, 2011) [32]. Bottle gourd being a monoecious is cross pollinated crop its major pollination is done by bees. Fruit is rich in protein, amino acids and minerals (Hegazy and El-Kinawy, 2011) [33] Bottle gourd known as one of excellent fruits gifted by nature to human beings by providing

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the composition of all essential nutrients, constituents, composition and medicinal important that are required to human beings to maintain good health.

## Biology and Ecology

### Genetics

The chromosome number of *Lagenaria siceraria* species reported is  $2n = 22$  (Singh 1990) [34]. These species are highly heterozygous and variable Hybridization is very common. The region with highest varieties and diversity of these species are found in India followed by west Africa (Stephens 2015) [35]. Tropical Africa is known as primary gene pool for this species (Singh 1990) [34].

### Reproductive biology

Flowers are monoecious, solitary and (female and male flowers are found on same plant) Both male and female flowers open at same time Female flowers are found with short stalked while male flowers are found with long stalked. And remain open only for few hours. It is a diploid species and cross pollination is highly favourable.

### Longevity

It is fast growing, vigorous annual wine (Stephens 2015) [35].

### Activity patterns

*L. siceraria* seeds usually start germinate after 5-7 days of sowing. Vine start emerging after 14 days. Flowering starts after 55-65 days. Male and female flower ratio is high under cool temperatures. The fruit yield per each plant is about 10-15 fruits.

### Environment requirements

The species is widely cultivated in tropical and sub-tropical climates and subtropical climates with temperature ranges from 19-27 C. And annual rainfall of 700-2800mm. soil type includes medium light heavy with PH range of 5.5-7.5 and germination temperature is 20-25.

### Morphology

Bottle gourd vines are quick growing annuals with hairy systems long forked tendrils, and a musky odour. Different forms of the bottle gourd have been cultivated for specific purposes, and the sizes of the vines, leaves and flowers as well as the shapes and sizes of the fruits, varies greatly.

**Plant profile:** (The Ayurvedic Pharmacopeia of Indian system of Medicine and Homeopathy; 2001. PP.215-6) [36]

It occurs throughout India and is grown worldwide now. common names include the following

Bottle gourd (English)

Lauki (Hindi)

Dudhi (Gujarati)

Ghiya (Urdu)

Sorakkai (Tamil)

**Properties mentioned in Ayurveda:** (The Ayurvedic Pharmacopeia of Indian system of Medicine and Homeopathy; 2001. pp. 215-6) [36].

Madhura (sweet)

Kashaya (astringent)

Sita (cool)

Vipaka (pleasant)

**Table 1:** Nutrient Content of Bottle Gourd (Gopalan *et al.*, 1971) [31] Rahman, 2003) [23]

Minerals	Units	Fruit	Seed	RDA
Magnesium	mg	11	535	300-400%
calcium	mg	26	43	800-100%
iron	mg	0.20	14.97	10-15%
sodium	mg	2	18	500.0%
phosphorous	mg	13	1174	800-1200%
potassium	mg	150	807	99.0%
manganese	mg	0.066	3.02	2.5-5.0%
copper	mg	0.026	1.387	2-3%
Zinc	mg	0.70	7.46	15.0%
selenium	mg	0.2	5.60	50-200%
Nutrients	Units	Fruit	Seed	RDA
Total lipid	g	0.02	45.85	20-22%
Protein	g	0.62	24.54	40-80%
Fiber	g	0.5	3.90	40-80%
Carbohydrate	g	3.39	17.81	1-2.5%
Vitamins	Units	Fruit	Seed	RDA
Thiamin	mg	0.029	0.21	1.5%
Niacin	mg	0.320	1.745	20.0%
Riboflavin	mg	0.022	0.320	1.8%
Vitamin C	mg	10.1	1.9	45-60%
Vitamin B6	mg	0.04	0.224	2.0%
Vitamin A IU	IU	16	380	2700-5000%
Folate total	mcg	6	58	200.0%
Vitamin E	mg	-	1.000	30iu/10mg%
Vitamin B 12	mcg	-	-	3.6%
Lipids	Units	Fruit	Seed	RDA
Fatty acids	g	0.002	8.674	-
Total saturated	g	0.009	20.904	-
Fatty acids total polyunsaturated	g	0.004	14.258	-
Fatty acids total monosaturated	g	0.004	14.258	-
Amino acids	Units	Fruit	Seed	RDA
Threonine	g	0.018	0.431	0.7%
Tryptophan	g	0.003	0.903	0.2%
Leucine	g	0.036	2.079	1.5%
Isoleucine	g	0.033	1.264	1.0%
Lysine	g	0.021	1.833	1.1%
Cystine	g	-	0.301	-
Methionine	g	0.004	0.551	0.7%
Arginine	g	0.014	4.033	280%
Histidine	g	0.004	0.681	-
Valine	g	0.027	1.972	1.1%
Phenylalanine	g	0.015	1.222	-

### Physiochemical properties of Bottle gourd

The *L. siceraria* fruits are fair source of beta carotene, ascorbic acid, dietary soluble fibres vitamin B complex and rich source of choline level a lipotropic factor, a curer of mental disorders. It is also embedded with required metabolite and metabolic functions with good source of amino acids and minerals antecedent for brain functions.

The *L. siceraria* fruit contain low waste index of (5.83%) and has edible index of (94.17%) hence proved to be important for processing. (Sawate *et al.*, 2009) [37]. The fruit is available at cheaper rate but rich in nutrients, vitamins, minerals, antioxidants and 96% of moisture. The fruit juice contains enzyme named betaglucosidase-elasterase. The fruit contains 1.6% choline in dry basis a chemical used to have neurological effects. (Thomas. 2008) [38]

The fruit is also reported to have soluble dietary fibres having profound effect in lowering serum cholesterol also reveals that pectin is predominant component of soluble fibres in *Lagenaria siceraria* fruit. The bottle gourd oil has many applications in various industries (Habibur 2003 [39]; Hassan *et*

*al.*, 2008) [40] It is a minor source of vegetable oil with significant amount of fats.

**Table 2:** Biochemical/chemical constituents of bottle gourd fruit

Macro and micro mineral content (mg/100g)					
Protein	Fats	Moisture	Fiber	Ash	Carbohydrates
1.20	0.20	94.5	0.70	0.50	3.75
Vitamin content (mg/100g)					
Vitamin B2(Riboflavin)	Vitamin B5(Niacin)	Vitamin B1(Thiamine)	Vitamin C (Ascorbic acid)		
0.05	0.30	0.03	12.0		
Macro and micro mineral content (mg/100g)					
P	Ca	K	Na	Cr	Fe
37.0	12.0	87.0	1.7	0.05	0.80

### Pharmacological activities

*L. sciceria* fruit juice extract was studied in mice and rats. Juice extract was studied for its anti-inflammatory and analgesic activity using acetic acid induced writhing and formalin induced pain tests in mice. LSFJE extracts (150-300mg/kg, p.o) exhibited dose dependent inhibition of writhing and also showed a significant inhibition of both phases of formalin test with less intense effect on first phase than second phase. *L. sciceria* juice extract also inhibited anti-inflammatory activity against acute inflammatory models i.e., ethyl phenyl propionate induced albumin induced paw edema, ear edema arachidonic acid induced hind paw edema in rats. LSFJE extract showed significant inhibitory effect on ear edema formation at 30 min, 1hr 2hr after ethyl phenyl propionate injection. The LSFJE extracts in other acute inflammatory models significantly constrained arachidonic acid induced hind paw edema and carrageenan. The juice extracts also constrained albumin induced paw edema for a period of 90 min. (Ghule *et al.*, 2006) [16]

### Antihyperlipidemic activity

*Lagenaria sciceria* antihyperlipidemic effect in triton induced hyperlipidemic rats were studied with four different extracts i.e., chloroform, petroleum ether, aqueous and alcoholic extracts from *L. sciceria* were administered orally. alcoholic and chloroform extracts at different doses (400 and 200 mg/kg, p. oo. significantly showed in lowering low density lipoprotein, lowering total cholesterol and triglycerides with an increased level of HDL. Constituents isolated from bottle gourd was found to be having antihyperlipidemic activity over triton-x induced hyperlipidemia. (Ghule *et al.*, 2006) [44]

### Antioxidant activity

Bottle gourd fruit epicarp extract of acetone by using DPPH showed maximum antioxidant property against *in vitro* models. The fresh juice shows free radical scavenging activity (Deshpande *et al.*, 2007) [45] found very effective as antioxidant, hepatoprotective, immunomodulatory antihyperglycemic and antihyperlipidemic agent. The extracts were assessed by 1,1- diphenyl 1-2 picrylhydrazyl assay by using Soxhlet apparatus and serial extraction technique. The fruit peel extracts at safe dosage of 50, 100 and 200mg/kg were tested in T4 induced hyperthyroid animals was found to be most effective and could inhibit levels of serum thyroxine and

glucose as well as hepatic LPO. After the treatment of 21 days reductions in concentrations of glucose, hepatic LPO and serum thyroid hormones were observed. (Dixit *et al.*, 2008) [41]

### Diuretic activity

The *L. sciceria* methanol extract and vacuum dried juice extracts was evaluated for Diuretic activity evaluated in albino rats (Ghule *et al.*, 2007) [17] by measuring different parameters like urine concentration of electrolytes such as sodium, chlorides and potassium and total urine volume at concentration of (100-200mg/kg. o) both vacuum dried fruit extracts and methanolic extracts showed higher urine volume and exhibited dose dependent increased in excretion of electrolytes compared to respective controls.

### Anticancer activity

Cucurbitaceae plant family possess antitumor activity the study was carried out to evaluate the anti-cancer activity of methanolic extracts of aerial parts of *Lagenaria sciceraria* on mice by inoculation of EAC (Ehrlich's Ascites Carcinoma) with MELS extracts at (200 mg and 400mg/kg) with standard drug 5-fluorouracil (20mg/kg) were continued for 9 days effect of drug response was made by study including biochemical estimation, increasing life span haematological parameters of liver tissue. Results revealed *L. sciceraria* shows significant anticancer activity due to its antioxidant and cytotoxicity properties. (Vichai and Kirtikara, 2006) [42]

### Antimicrobial activity

The *Lagenaria sciceraria* methanolic extracts of seeds, leaves and flesh fruit are extensively used for treatment of skin disorders in traditional medicine. Goji evaluated antimicrobial activity of Ls by using agar-well diffusion method. Results revealed *L. sciceraria* methanolic extracts show activity against *Streptococcus pyogenes* and *Pseudomonas aeruginosa*, but not significant against isolates of *Escherichia coli* and *S. aureus*. Thus, antimicrobial activity in *Lagenaria sciceraria* can be used to treat skin disorders. (Goji *et al.*, 2006) [43]

### Cardioprotective activity

The *L. sciceraria* fruit powder showed good cardioprotective effects in rats. The drug was induced against Doxorubicin induced cardiotoxicity in rats at 200mg/kg, p.o for 18 days prevents alteration in antioxidants and reduced glutathione. The extracts powder and ethanolic extracts of LS showed protection against changes in histopathological alternation induced by doxorubicin and increased in force of contraction and decrease in rate of contraction in isolated rats. (Deshpande *et al.*, 2008 [46]; Hassanpour *et al.*, 2008) [47]

### Anthelmintic activity

The *L. sciceraria* seeds show anthelmintic activity against *Hymenolepis nana* (tapeworm) *Pheretima postuma*, and *Aspicularis tetraptera* (pinworm) infections in mice was evaluated using piperazine citrate concentration at (10-mg/ml) as reference substance and distilled water as control. The ethanolic seed extracts of *L. sciceraria*, *Cucumis sativus* and *Cucurbita maxima* showed potent activity and also caused death of tapeworms. (Thube *et al.*, 2009) [48]

**Table 3:** Utilization of plant parts in bottle gourd

Parts Used	Utilization in Food	Effect on Health	Supportive Evidence
Fruit	Juice Jam Jelly Pickles	Antibacterial Antimicrobial Antioxidant	The alcoholic extracts of <i>L. siceraria</i> showed antibacterial activity against <i>E. coli</i> at 30, 40, and 50mg respectively and lower inhibitory effect against <i>B. subtilis</i> , <i>S. aureus</i> at 30, 40 and 50mg. (Handayani, 2017) <sup>[49]</sup> Methanolic extracts of <i>L. siceraria</i> by using the agar well diffusion method showed antimicrobial activity against <i>Streptococcus pyogenes</i> and <i>Pseudomonas aeruginosa</i> (Goji <i>et al.</i> , 2006) <sup>[43]</sup> . The DPPH (1,1-Diphenyl-2-picrylhydrazyl) radical scavenging activity of n-butanol and ethyl acetate extracts of fresh fruits of <i>L. Siceraria</i> (Erasto and Mbwambo, 2009) <sup>[50]</sup> showed antioxidant activity and indicated that fruits are a potential source of natural antioxidants (Deore <i>et al.</i> , 2009) <sup>[51]</sup> .
Seed	Soup thickener Edible oil Flour	Analgesic Acute-inflammation Anti-ulcerogenic activity	In analgesic activity on acetic acid-induced writhing peels at a concentration of 400mg/kg showed excellent results by inducing 75% in carrageenan-induced rat paw edema test (Santos 2004; Cashin <i>et al.</i> , 1997). Plant extracts of <i>L. siceraria</i> at doses of 200mg/kg and 400mg/kg body weight showed 67.3% and 71.85% inhibition of edema in rats at end of 6hrs. Diclofenac sodium (10mg/kg), Peels 200mg/kg, and 400mg/kg were orally administered in 6 rats and fasted for 16hrs control for anti-ulcerogenic activity showed lesser curvature of the stomach and no drastic lesions as compared with control. (Cashin <i>et al.</i> , 1997 <sup>[52]</sup> ; Santos 2004) <sup>[53]</sup>
Leaves	Juice Chutney Curry	Antiallergic activity Antifungal activity Radical scavenging activity	The methanolic extracts of <i>L. siceraria</i> leaves showed dose-dependent (10-30µg/ml) anti-allergic activity against compound 48/80 induced mast cell degranulation in rats. (Nidhi <i>et al.</i> 2019) <sup>[54]</sup> Crude extracts of <i>L. siceraria</i> leaf showed the highest mean zone of inhibition from 9.0-11.0 at a concentration of 100mg/mL against <i>Aspergillus Niger</i> , <i>Aspergillus flavus</i> (Habib-ur Rahman 2003) <sup>[23]</sup> . Ethanol extracts of <i>L. siceraria</i> at 50µg/ml concentration by using DPPH assay displayed 19% scavenging activity. chloroform extracts of <i>L. siceraria</i> at 50µg/ml displayed 10.9% scavenging activity (Rachh <i>et al.</i> , 2009 <sup>[55]</sup> ; Rahman <i>et al.</i> , 2012) <sup>[56]</sup>
Stem and Flowers	Dried powder	Antibacterial activity Antifungal activity	Methanolic extracts of aerial parts of <i>L. siceraria</i> showed antibacterial activity <i>L. monocytogenes</i> and <i>M. flavus</i> (Disha <i>et al.</i> , 2014) <sup>[57]</sup> . The aqueous extracts of <i>L. siceraria</i> showed the highest antifungal activity against <i>S. Typhimurium</i> and <i>E. aerogenes</i> (Adeniyi BA and Odufowora 2000) <sup>[58]</sup> .

**Health benefits of bottle gourd (Tyagi *et al.*, 2017) <sup>[28]</sup>**

1. The leaves, stem, fruits, oil and seeds of bottle gourd are used traditionally in the treatment of diabetes, ulcer, piles, colitis hypertension, insanity and skin diseases.
2. The pulp of *Lagenaria siceraria* is used as cooling, diuretic, sedative and anti-bilious.
3. Seed is vermifuge.
4. Extracts of plants have shown antibiotic activity.
5. The juice extracted from bottle gourd leaves helps cure jaundice and reduce graying of hair.
6. The Bottle is rich source of water and minerals and are believed to possess vitamin A, C and B complex.
7. The bitter principle found in wild bottle gourds is responsible for purgative property.
8. The crushed leaves of bottle gourd are used for baldness and applied for the treatment of headaches.
9. It is believed to help the liver function in balanced condition.
10. The consumption of bottle gourd juice combined with lime juice helps treat burning sensation in urinary passage.
11. As it is rich in fiber it helps to fight constipation.
12. In summers it reduces fatigue and keeps fresh.
13. Ayurveda highly recommends this food for diabetic patients due to its low fat and fiber content.
14. The fruit is rich in Vitamin C, Zinc, iron, Thiamin thus helps in improving overall health.
15. It is considered as one of best weight loss food since it is 96% water and provides just 12 calories per 100g of saving.
16. Ayurveda recommends bottle gourd juice in treatment of acidity, indigestion and ulcers. Indian traditional medicine

claims that bottle gourd acts as nerve tonic and can help improve obsessive compulsive disorder.

**Traditional and medicinal uses**

The bottle gourd fruit, seeds, leaves, oil are traditionally used by local people as folk medicines, cardio tonic, antidote, diuretic, cardioprotective in the treatment of diabetes, ulcer, piles, fever cough and asthma (Nadkarni KM. 1954) <sup>[59]</sup>. The fruit pulp is used as emetic, cool, purgative and sedative. The flowers are used against certain poisons. (Kritikar KR, Basu BD 2005) <sup>[60]</sup>. Leaf extracts are used for baldness and to treat headaches. (Rahman AS 2003) <sup>[23]</sup> Leaves with added coconut oil or salt are used for tumours and skin irritation. seed act as vermifuge roots are used in dropsy. The gourd juice if consumed with lime juice helps to treat burning sensation in urinary passage and also act as nerve tonic and help to improve obsessive compulsive disorder (OCD). It is rich in vitamin A, C, zinc, iron and B complex thus help in improving overall health.

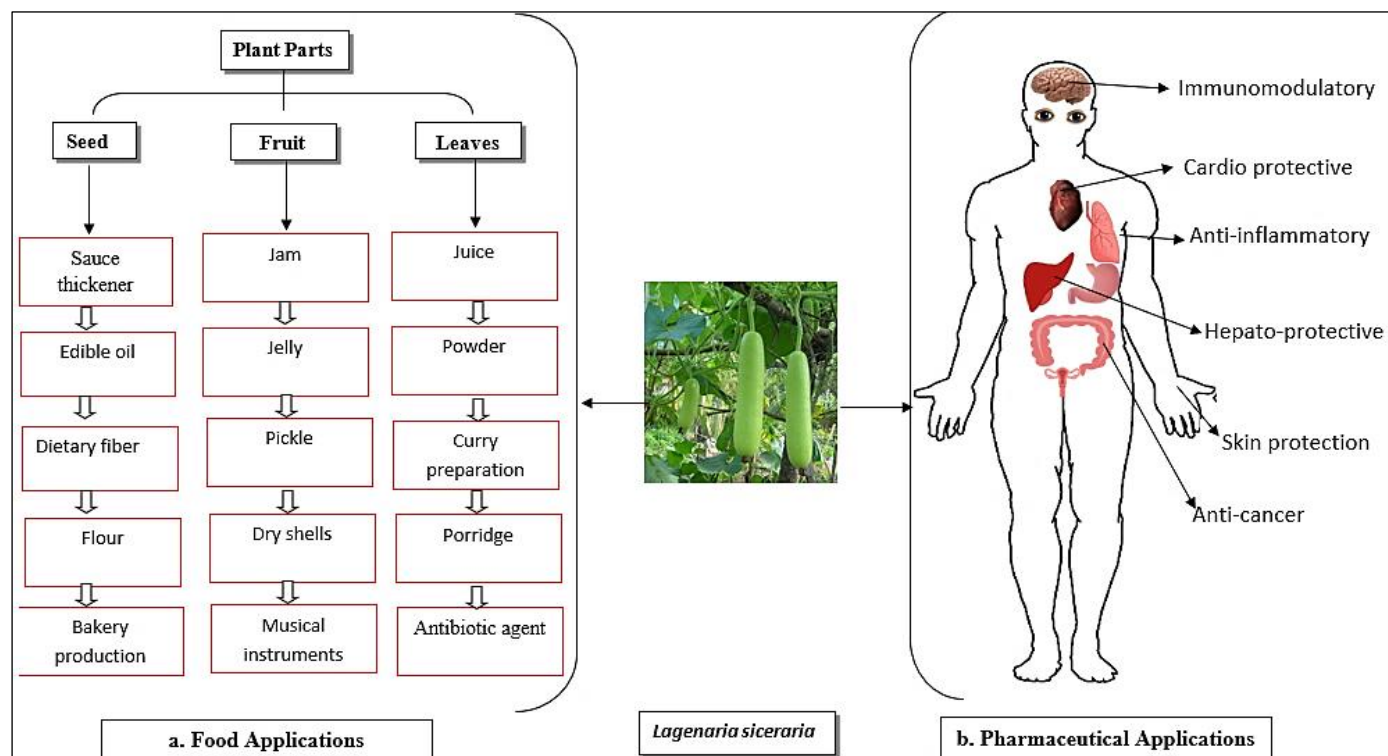
In northern Telangana tribal communities like Gutti koyas, Lambada's, and koyas use dry hard shells for various purposes like bottles, bowls, spoons and milk pots. In Khammam district ethnic groups are using dry shells for carrying liquor, water and honey. It is also being used for making wind and stringed musical instruments and pipes. since the beginning of their history, they had multiple uses including food, toys, kitchen tools including wide variety crafts, including jewellery, dishes and wide variety of decorations using carving and other techniques. (Summit G, Widess 1999) <sup>[61]</sup>

**Table 4:** Ethnobotanical applications in cucurbits (Habibur 2003) [39]

System	Lagenaria Siceraria Bottle gourd	Cucurbita (pumpkin)	Cucumis sativus cucumber	Momordica Charantia Bittermelon	Sechium Edule (chayote)	Citrillus Lanatus (watermelon)	Trichosanthes Cucumerina (snake gourd)
Infections	Alopecia Sore, boil Rheumatism Tumour wound	Fever Measles Smallpox Vermifuge scrofula	Scald Pneumonia Wound Cancer burn	Antibiotic Colitis Eczema Scabies swelling	Pertussis	Antiseptic Aphthae Dermuclent malaria	Alexiteric Fever Vermifuge refrigerant
Gastro	Adenopathy Purgative Lithontriptic laxative	Anthelmintic Diuretic vermifuge	Dupepsia dropsy	Digestive Dysentery Hepatitis jaundice	Cathartic Intestine stomach	Digestive Peptic stomatitis	-
CNS	Headache Toothache Insanity convulsion	Nervine Refrigerant	Demulcent Emetic Refrigerant	Earache Fatality Swelling bilious	Colic Emetic repellant	Refrigerant bruise	Nervine abdomen
Genital	Dropsy Litholytic lithntriptic	Diuretic	Hyperglycemia Orchitis	Kidney Piles stone Renitis urethritis	Nephritis Oliguria	Urogenital Dysuria	Anacarsa Thrist
Respiratory	Asthama	Cough	Coryza cough	Asthama	cold	Pertussis	Cough Asthama
Immuno	Cancer Tetanus	Scrofula Tumour	Tumour	Hemaglutittant	Eczema Polypus leprosy	Tetanus	Tumour
Skin	Leucoder ma Anasarca Pimple wound	Smallpox Boil Wart	Eczema Sunstroke Taenifuge	Wound scabies	Astringent psoriasis Eruption	Leprosy leucoderma	Abscess Cosmetic rash
Poision	Antidote Alexiteric	Antidote	Alexiteric	Insectide Bite	Parasitide	Alcoholism	Alexiteric Antidote
ENT	Gum Hoarsness	Cattarch Eye	Snuff Itch	Coryza	Hoarsness Gum	Secretion Conjunctivitis Meibomian	Lactoguge caries
Nutr	Antibiotic	Tonic Wart	Tonic	Hemostat	Longevity	Tonic	Tonic

**Table 5:** Pharmacology of bottle gourd

Sr. No.	Property	Test mode	Dose concentration method	Mechanism of action	References
1	Diuretic activity	Adult wistar rats	Animals were divided into 2 groups on day of experiment first group with LSJE (100mg/kg and 200mg/kg, P.o) LSME (100mg/kg 200mg/kg) and second group is treated with furosemide at (20mg/kg, i.p) kept at room temp (25±0.5 °C) for 24 hrs.	Dose-response studies showed maximum activity at 200mg/kg by LSME and LSJE extracts. The excretion of potassium, sodium and chloride has also been significantly increased. The fruit juice extracts and methanolic extracts act as effective hypernatremic and hyperchloremic diuretics.	BV Ghule <i>et al.</i> , (2007) [17] Upwar <i>et al.</i> , (2011) [62]
2	Antidiabetic property	Diabetic patients	Involved administration of fresh bottle gourd juice (200ml) to 50 volunteers on empty stomach for 90 days.	Study involved notable reduction in blood glucose levels, total cholesterol level (17.8%) serum triglycerides (16-22%) LDL-C (22.2%).	C Katare <i>et al.</i> , (2013) [63] S Minocha (2015) [64] M Zahoor <i>et al.</i> , (2021) [65] A Rolnik, B Olas (2020) [66]
3	Antihyperglycemic Activity	Male albino rats	Alloxan monohydroxide (150mg/kg) was induced in single dose and rats in which hyperglycemia blood glucose level above 260mg/dl) was induced for 48 hrs.	Experimental studies showed alloxan induced hyperglycemic rats showed increase in blood sugar levels which were reduced to significant extent by EELS of (100 and 200mg/kg).	Yusuf <i>et al.</i> , (2022) [67]
4	Antihyperlipidemic activity	Adult rats	Administration of Triton Induced (Iso octyl polyoxy ethylene phenol at (350mg/kg) and EELS at 100 and 200 mg/kg was served for 48 hrs.	Cholesterol and triglycerides levels of blood was increased by 3.5 and 9.5 folds by administration of triton and EELS (100 and 200mg/kg) prevented rise in cholesterol and triglycerides.	C Mehta <i>et al.</i> , (2013) [68] Zhaoor <i>et al.</i> , (2021) [65]
5	Cardioprotective Activity	Adult rats	Administration of isoproterenol (200mg/kg) and fruit extracts of <i>Lagenaria siceraria</i> at 400mg/kg for 30 days in rats.	Studies showed rats induced with isoproterenol showed alteration in enzymes like creatinine kinase, homocysteine, and decrease in levels of serum protein fruit 6 extracts showed restoration in biochemical parameters.	A Upaganlawar (2017) [69] ME SERAG (2020) [70]



**Fig 1:** Uses of *Lagenaria siceraria*

## Conclusion

*Lagenaria siceraria* is well known for its Indian system of medicine. The plant sources are used as a supplement for the treatment of cardiac disease, hepatic disease, ulcers, etc., The potential activity of fruit is might be due to its phytochemical constituents present in it. Presently there is increasing interest worldwide in herbal medicines accompanied by pharmacological and bioactive ingredients. Numerous drugs have entered the market through the exploration of ethnopharmacology and traditional medicine. Efforts are therefore needed to validate evidence regarding the safety and practices of ayurvedic medicines.

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