PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE OF LAGENARIA SICERARIA: AN OVERVIEW

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ABSTRACT
Cucurbitaceae family is major source of medicinal agents since ancient time. Various plants parts including fruits of this family have been established for their pharmacological potential. *Lagenaria siceraria* (Molina) standley (family Cucurbitaceae) commonly known as lauki (Hindi) and bottle gourd (English) is a medicinal plant. It is used as medicine in India, China, European countries, Brazil, Hawaiian island, etc. for its cardiotonic, general tonic and diuretic properties. Further the antihepatotoxic, analgesic and anti-inflammatory, hypolipidemic, antihyperglycemic, immunomodulatory and antioxidant activities of its fruit extract have been evaluated. It is used as vermifuge purgative diuretic and it is also recommended for increasing lactation for lactating women. Fruits are also used in treatment of cancer, pain, ulcer, fever, pectoral cough, asthma and other bronchial disorders. In many countries, this plant has been used traditionally as a single treatment for diabetes mellitus possess immunosuppressive, antitumour, antiviral, antiproliferative and anti-HIV activities. This study is an attempt to compile an up-to-date and comprehensive review of *Lagenaria siceraria* that covers its traditional and folk medicinal uses, phytochemistry and pharmacology profile.

KEYWORDS: *Lagenaria siceraria*, Cucurbitaceae, Traditional uses.

INTRODUCTION
Cucurbitaceae family is commonly known as gourd, melon and pumpkin family. This family is composed of 118 genera and 825 species which are widely distributed in the warmer region of world1. Among all the plants of Cucurbitaceae family *Lagenaria* species is the most popular. The bottle gourd belongs to the genus *Lagenaria* that is derived from the word lagena, meaning the bottle. In the older literature it is often referred to as *Lagenaria vulgaris* (common) or *Lagenaria leucantha* (white flowered gourd), but now it is known as *Lagenaria siceraria*. *Lagenaria siceraria* (Molina) standley (family Cucurbitaceae) commonly known as lauki (Hindi) and bottle gourd (English) is a medicinal plant2. The plant is widely available throughout India. It is a climbing or trailing herb, with bottle- or dumb-bell shaped fruits. Both its aerial parts and fruits are commonly consumed as a vegetable. Traditionally, it is used as medicine in India, China, European countries, Brazil, Hawaiian island, etc. for its cardiotonic, general tonic and diuretic properties3. The cultivated form of *L. Siceraria* is considered to be of African and Asian origin. *Lagenaria siceraria* is a popular vegetable, grown almost all the year round, particularly in frost free areas. It can be cultivate in all kinds of soil, but thrives best in heavily manured loams. It requires warm humid climate or plenty of water when grown during dry weather. Seeds may be sown in nursery beds and seedlings transplanted when they have put forth 2-3 leaves. They may be also sown directly, 4-5 seeds together, in manured beds or pits 5-6ft. Apart; the strongest among the seedlings is retained, while others are removed and transplanted. Seedling transplantation is where an early crop is desired, generally two crop raised in India; the summer crop is sown from the middle of October to the middle of March and the later crop, from the beginning of March to the Middle of July. Round fruit types are usually sown for the early crop and bottle-shaped types for the second crop. Vines are allowed to trail on the ground or trained over walls. Trees, or other support trailing over to give high yield of fruit4.

TAXONOMICAL CLASSIFICATION

<table>
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<tr>
<th>Kingdom</th>
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<tr>
<td>Division</td>
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<td>Cucurbitaceae</td>
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<tr>
<td>Genus</td>
<td>Lagenaria</td>
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<tr>
<td>Species</td>
<td>L. siceraria</td>
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SYNONYMES

| Sanskrit | Alabu, Tumbi Ishavanka, Katutumbi, Tiktaalabu, alaaba |
| Bengali | Laua, Lokitumbi |
| English | Bottle Gourd |
| Gujrati | Dudi, Tumbadi |
| Hindi | Lauki, Ghia |
| Kannad | Isagumbala, Tumbi |
| Malayalam | Chorakka, Churan, Choraiakka, Piccura, Tumburini, Cura, Tumburu |
| Marathi | Phopla |
| Punjabi | Tumbi, Dani |
| Tamil | Shorakkai, Surai, Suraikkai |
| Telugu | Sorakaya, Anapakaya |
| Urdu | Ghiya, Lauki |

Characteristics of Lagenaria siceraria
Transverse section of upper epidermis of *Lagenaria siceraria* leaf consists of elongated parenchymatous cells, covered by cuticle. It shows few stomata, which are of anisocytic type, palisade cells at upper and hexagonal to polygonal at lower epidermis. Thin walled contains colourless cells, which are may be water storing. Mesophyll is made up of 3-4 layered chloroplast containing, compactly arranged, oval to circular cells. It is interrupted by vascular bundles of various sizes. Vascular bundles are surrounded by 2-3 layered.
Phytoconstituents of Lagenaria siceraria

Analysis of edible portion of the fruit gave following values: moisture, 96.3; protein, 0.2; fat (ether extract), 0.1; carbohydrates 2.9; mineral matter 0.5; calcium 0.02; and phosphorus < 0.01%. Other mineral elements reported to be present are: iron (0.7 mg/100g.), sodium (11.0 mg/100g.), potassium (86.0 mg/100g.) And iodine (4.5 mcg/ kg.). Glucose and fructose have been detected. The amino acid composition of the fruit is as follows; leucines 0.8; Phenylalanine 0.9; valine 0.3; tyrosine 0.4; alanine 0.5; threonine 0.2; glutamic acid 0.3; serine 0.6; aspartic acid 1.9; cystine 0.6; cysteine 0.3; arginine 0.4; and proline 0.3m.

The fresh product were assayed, determining the antioxidant status in experimental diabetic rats

Pharmacological Activity

Antidiabetic activity

Saha et al.,(2011), evaluated the methanolic extract of Lagenaria siceraria aerial parts for antidiabetic activity ,using streptozotocin induced diabetes in rats and proved that the aerial part of the Lagenaria siceraria posses potent antihyperglycemic activity which is probably attributable to its rich flavanoid content and concluded that MELS (methanolic extract of Lagenaria siceraria) supplementation is quite beneficial in controlling the blood glucose level, without producing hypoglycemia; additionally, it improves lipid metabolism and represents a protective mechanism against the development of atherosclerosis, and prevents diabetic complications from lipid peroxidation by improving the antioxidant status in experimental diabetic rats17.

Antihyperlipidemic activity

Nainwal et al.,(2011), evaluated the juice of fresh fruits of Lagenaria siceraria for antihyperlipidemic activity by evaluating the blood cholesterol level of atherogenic diet rat and proved that juice of the fresh fruits of Lagenaria siceraria have the potent effect to cause a blood cholesterol lowering effect and the serum biochemistry changes may suggest that the juice extract has a tonic effect on the kidneys and the liver and their organs play central role in drug metabolism16.

Ghule et al.,(2009), evaluated antihyperlipidemic effect of the methanolic extract from Lagenaria siceraria fruit in hyperlipidemic rats and proved that at the 30th day most significant reduction in lipid levels in the LSFE treated rats as compared to the rats fed with high-fat diet at the 0th day and shows that the increase in weight in rats administered with LSFE was less when compared to rats fed with high-fat diet.18

Mohane et al.,(2008), evaluated the fruits of Lagenaria siceraria for antihyperlipidemic activity of isolated constituent using the solvents according to the polarity in ascending order i.e. by using chloroform, acetic acid, methanol, pyridine and water. Thin layer chromatography used active fraction obtained by column chromatography for further isolation .four spots were obtained and were named as LSN-1, LSN-2 ,LSN-3 and LSN-4and TLC isolated compound were tested for antihyperlipidemic activity and compound has shown significant result. The study exhibited that evaluated levels of blood cholesterol, triglycerides, LDL were significantly reduced and decreased HDL was significantly increased by the administration of fraction of Lagenaria siceraria fruit juice19.

Pharmacy activity

Ghule et al.,(2006), evaluated the antihyperlipidemic effect of four different extract via. petroleum ether, chloroform, alcoholic and aqueous extracts from the Lagenaria siceraria in triton induced hyperlipidemic rats and their hypolipidemic rats and proved that chloroform and alcoholic extract exhibited more significant effect in lowering total cholesterol, triglycerides and low density lipoprotein along with increase in HDL as compared to other20.

Diuretic activity

Ghule et al.,(2007), evaluated the vacuumed dried juice extract and methanolic extract of the fruit of Lagenaria siceraria for diuretic activity using total urine volume and urine concentration of electrolyte method in albino rats and proved that the vacuum dried juice extract and methanolic
extract showed higher urine volume when compared to respective control.21

**Analytic activity**

Shah and Seth (2010), evaluated methanolic and aqueous extract of Lagenaria siceraria for analgesic activity, using tail immersion method in rats and proved that methanolic extract posses moderate analgesic activity, while the aqueous extract shows significant analgesic activity.22

**Central nervous system activity**

Pawar et al., (2010), evaluated the crude petroleum ether, chloroform, and methanolic extract of leaves of Lagenaria siceraria for analgesic and central nervous system activity using writhing, hot plate, tail flick method in rat and proved that the petroleum ether, methanol, and chloroform extract shows significant analgesic activity but petroleum ether extract shows maximum analgesic activity among them.23

**Anticancer activity**

Saha et al., (2010), Evaluated the methanolic extract of Lagenaria siceraria (Mol.) Standley aerial parts for anticancer activity using Enrich’ Ascites carcinoma model in mice and proved that the Lagenaria siceraria possesses significant anticancer activity which may be due to its cytotoxicity and antioxidant activity24.

**CNS depressant activity**

Ananga et al., (2010), Evaluated the aqueous fruit extract of Lagenaria siceraria for pharmacological activity in vitro and in vivo and proved that the Lagenaria siceraria have been shown to certain potent bioactive compound with potent analgesic effect and non specific C.N.S depressant activity, among others and may be of value in psychotherapy as narcoleptic agent and also confirmed some of the folkloric uses.25

**Antioxidant and hepatoprotective activity**

Saha et al., (2011), Evaluated the methanolic extract of the aerial parts of the Lagenaria siceraria for antioxidant and hepatoprotective activity using DPH, nitrite oxide, superoxide, hydrogen peroxide and total phenolic and flavanoid content estimation method in rats and proved that methanolic extract of aerial parts show the significant in vitro antioxidant and potent hepatoprotective activity.26

**Cardioprotective activity**

Fard et al., (2008), Evaluated the cardioprotective effect of Lagenaria siceraria fruit powder against the cardiotoxicity of doxorubicin in wistar male. and proved that the Lagenaria siceraria possessed cardioprotective effect against doxorubicin induced cardiotoxicity in rats.27

**USES**

It is used as medicine in India, China, European countries, Brazil, Hawaiian island, etc. for its cardiotoxic, general tonic and diuretic21 properties. Further, the anti diabetic22, antihyperlipidemic18-20 antihypertensive, analgesic22, CNS activity2, hypertension2, anticancer3, CNS depressant7, Cardioprotective28, antiinflammatory, anti hyperglycemic, immunomodulatory and antioxidant29 activities of its fruit extract have been evaluated. A novel protein, lagenin, has also been isolated from its seeds and it possesses antitumor, immunoprotective and antiproliferative properties.30

Although extensive studies have been carried out on its fruits and seeds, the pharmacology of the aerial parts of L. siceraria has not been studied yet. In many countries, this plant has been used traditionally as a single treatment for diabetes mellitus.31

**Traditional uses**

Cooked lauki is cooling, calming and acts as diuretic. It makes you relax after eating. But don’t eat the vegetable raw as it can harm the stomach and intestines. It plays a very important role in treating urinary disorders. Prepare a glass of fresh juice by grating lauki and then mixing it with lime juice. Drink it once a day to combat the burning sensation caused by the high acidity of urine. It can be had along with sulpha drugs to treat urinary infection as it acts as an alkaline diuretic. Lauki juice is an excellent remedy for excessive thirst caused by diarrhea, over consumption of fatty or fried foods, and diabetes. Drink a glass of this juice with a little salt added to it to treat this condition. A glass of lauki juice with a little salt added to it prevents excessive loss of sodium, satiating thirst and keeping you refreshed in summer. If you are on a low calorie diet, suffering from digestive problems, are diabetic or convalescing, then lauki is must for you as it is easily digestible and low in calories.30

**REFERENCES**


