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MEDICINAL SIGNIFICANCE OF *LAGENARIA SICERARIA*; A SUMMARIZING ASSESSMENT

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ABSTRACT: The Cucurbitaceae family has been utilized as a medicinal option in human medicine from ancient times. The bottle gourd (*Lagenaria siceraria*) is popularly known as lauki, ghia or dudhi in India. This is grown worldwide in the tropical climates of Africa, Asia, the Americas, and Europe. There are over 800 species and 130 genera in this family. Because of their potential for therapeutic use, researchers have looked into a variety of plants in this family, including *Lagenaria siceraria. L. siceraria* has been linked to several health benefits for humans, including antioxidant, immunosuppressive, hepatoprotective, hypolipidemic, diuretic, laxative, analgesic, antihypertensive, cardioprotective, central nervous system stimulant, anthelmintic, and free radical scavenging. This plant's fruit is frequently consumed as a low-calorie vegetable. The biological chemicals found in the species are diverse and include terpenoids, flavonoids, sterols, and saponins. The edible portions of this plant also contain proteins, terpenoids, flavonoids, vitamins, choline, and other phytochemicals. In addition to 17 distinct amino acids, the seeds of *L. siceraria* have been discovered to contain several minerals. Per 100 g of *L. siceraria*, there are 14 kcal of energy, 3.39 g of carbs, 0.62 g of protein, 0.2 g of fat, and 0.5g of fiber, according to the USDA nutritional database. There are numerous pharmacological and physiological activities carried out by *L. siceraria* demonstrates the extraordinary potential to treat a variety of human and animal disorders. This comprehensive analysis's main goal is to provide an overview of the information regarding the advantages and disadvantages of consuming *L. siceraria* for human and veterinary health.

INTRODUCTION: Globally, there is growing concern about herbal remedies, which is reinforced by increased lab studies into the pharmacological properties of bioactive compounds and their potential to treat different ailments. Numerous novel drugs have entered the global market because of ethnopharmacology and traditional medicine [1]. Herbal remedies have been used for millennia to treat and cure a wide range of illnesses.

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Because they have few side effects and are thought to be safe and effective in treating human problems, herbal remedies are a good substitute for the synthetic treatments that are now in use. *Lagenaria siceraria* (Mol.) Standley fruit, or bottle gourd, is a member of the Cucurbitaceae family and is used to treat a variety of illnesses in a different traditional medical system [2].

The Cucurbitaceae family has a sizable number of plants with therapeutic benefits. There are over 800 species and 130 genera in this family. It has been reported that cucurbitacin, a secondary metabolite present in the fruit and seeds of certain cucurbit species, possesses purgative, emetic, and antihelmintic properties.

This class of compounds has been studied for its cardiovascular, cytotoxic, hepatoprotective, and anti-inflammatory qualities. The Cucurbitaceae family, which includes the bottle gourd (*L. siceraria*), is a medicinal plant whose various parts have been found to have therapeutic potential. The fruiting body of the plant is highly prized for both its flavor and exceptional nutritional value, including almost all of the elements required for optimal health. The plant may yield polysaccharides that are physiologically active [3].

It is used as food and medicine because it is a household plant. Numerous parts of this plant have been studied for their cardiovascular, antidepressant, anti-hyperglycemic, antimicrobial, cytotoxic, anti-inflammatory, antihyperlipidemic, anti-urolithiasis, antianxiety, analgesic, anticancer, diuretic, anthelmintic, antihepatotoxic, antistress, immunomodulatory, antiulcer, hepatoprotective, and antioxidant properties. This review examines the phytochemical components, traditional, pharmacological, and therapeutic uses of this plant in order to highlight its medicinal significance. This could help revive its significance and draw attention to its numerous potential benefits, which could inspire researchers to go deeper into the study of *L. siceraria*. This comprehensive analysis's main goal is to provide an overview of the information regarding the advantages and disadvantages of consuming *L. siceraria* for human health as well as veterinary domains like the poultry and cattle industries [4].

Botonical Specimens: Bottle gourd, or *L. siceraria* (Molina), is a member of the Cucurbitaceae family. This perennial climbing plant is widely cultivated for its vegetable produce around the world, especially in tropical countries like Thailand, Egypt, India, and Japan [1, 5]. The bottle gourd fruit can grow to be more than a meter long and can take on a variety of shapes, including large and spherical, small and bottle-shaped, and narrow and sinuous. Generally, rounder types are referred to as calabash gourds. 24 distinct fruit shapes were investigated, as seen in **Fig. 1**, as part of a study on the phytogeographical distribution and fruit diversity of *L. siceraria* in Nigeria [6].

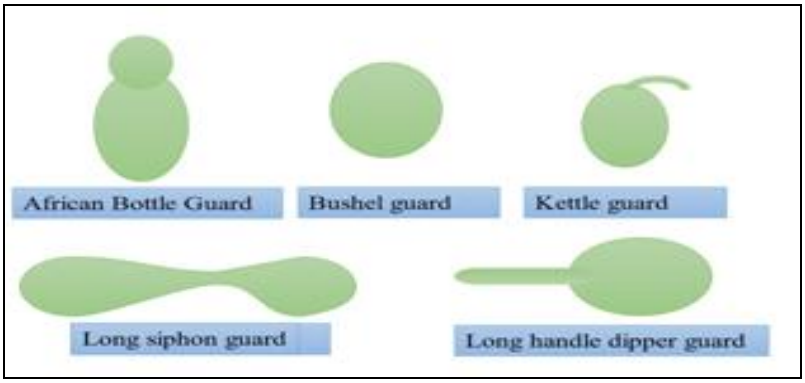

FIG. 1: DIFFERENT SHAPES OF *LAGENARIA SICERARIA* FOUND ACROSS THE WORLD

Plant Profile: *Lagenaria vulgaris* Seringe and *Lagenaria leucantha* Rusby are other names for LS. The term "bottle gourd" is used in English, alabu in Sanskrit, lauki or ghia in Hindi, dudhi or tumbadi in Gujarati, sorakkai in Tamil, chorakkaurdu in Malayalam, and ghiya in Urdu. Geographically, it is found all across India and is currently grown all over the world.

It is widely acknowledged that LS originated in Africa and spread to temperate and tropical regions of Asia and the Americas approximately 10,000 years ago [7].

Properties and Action Mentioned in Ayurveda [7]:

TABLE 1: PROPERTIES AND ACTION MENTIONED IN AYURVEDA

Rasa	Madhura (Sweet)
Guna	Snigdha (viscous)
Virya	sita (cool)
Vipaka	Madhura (pleasant)
Karma	Pittahara, Hardya, Vrsya

Morphology: Robust herb that grows annually. Stems can be up to 5 meters long, angular, ribbed, thick, brittle, gently hairy, prostrate or ascending, and cut stems do not release sap. The leaves are simple, measuring up to 400 mm in length and 400 mm in width. They are long petioled, five-lobed, cordate, pubescent, briefly and gently hairy, and

broadly shaped like an egg, kidney, or heart. The lobes are rounded, the margins are slightly toothed, and the crushed leaves are not scented. Up to 300 mm long, thick, frequently hollow, heavily hairy leaf stalks with two tiny lateral glands positioned near the base of the leaf. Tendrils divide in half. Flowers are solitary, crisped, cream or white in color with darker veins, pale yellow at the base, obovate, up to 45 mm long, opening in the evenings, and quickly fading. Female flower stalks are shorter than male flower stalks. Fruits are big, erratic, cylindrical, flask-shaped, or globose with a constriction above the center; they are green, meaty, very hairy, indehiscent, and mature to a pale brown or yellowish color. The pulp dries up as the fruit ripens, leaving a thick, hard hollow in the center. Numerous seeds are compressed, immersed in a spongy pulp, and have two flat face ridges. Some varieties have more irregular and rugose seeds [8].

FIG. 2: *LAGENARIA SICERARIA* PLANT

Biology and Ecology of *Lagenaria siceraria* plant

TABLE 2: BIOLOGY AND ECOLOGY *LAGENARIA SICERARIA* PLANT

Biology and Ecology			
Genetics	**Biology of Reproduction**	**Durability**	**Patterns of Activity**
Lagenaria siceraria species has been reported to have 2n = 22 chromosomes [9]. These species exhibit considerable heterozygosity and variability, with frequent hybridization. The West Africa and India are the two regions with the greatest diversity and variety of these species. The primary gene pool for this species is thought to be in tropical Africa [10].	There are male and female blooms that are monoecious and solitary. are present on the same plant) The time at which the male and female flowers bloom Male flowers often have lengthy stalks, whilst female blooms have short stalks. and just stay open for a few hours. Since it is a diploid species, cross-pollination is quite advantageous [10].	It is an annual wine that grows vigorously and quickly [10].	After being sown, L. siceraria seeds often begin to germinate in 5-7 days. After 14 days, the vine begins to emerge. Following 55–65 days, flowering begins. In cool weather, the ratio of male to female flowers is high. Each plant yields between ten to fifteen fruits [10].

Traditional Uses: In Asia and Africa, the fruit is widely used as a medical vegetable to treat a wide range of illnesses. Several parts of this plant, including the fruit, seed, leaf, and root, are used in alternative medicine [11]. The fruits of the plant were mentioned as potentially beneficial in Ayurveda and other folk treatments. Cardioprotective, antidote, aphrodisiac, cardiotonic, diuretic, and general tonic characteristics are among the fruit's traditional applications [12]. Because the fruit juice had strong antioxidants, it had been used to treat liver conditions including jaundice [13]. This plant has been linked to several health benefits for humans, including antioxidant, immune-suppressive, hypolipidemic, diuretic, laxative, hepatoprotective, analgesic, antihypertensive, cardioprotective, central nervous system stimulant, anthelmintic, and free radical scavenging [14].

The Cucurbitaceae family of plants has many medicinal uses, including anti-HIV, antipyretic, anthelmintic, anxiolytic, carminative, anti-diabetic, antibacterial, antioxidant, laxative, anti-tuberculosis, anti-diarrheal, and purgative. It is also used as a diuretic, cardiotonic, and contraceptive. Additionally, there are expectorant, cytotoxic, antitussive, and anti-inflammatory properties. Methanol and the vacuum-dried fruit juice extract's diuretic properties have been investigated. Comparing albino rats to the control group, the former had more urine in their system. Electrolyte excretion increased in both extracts in a dose-dependent manner. This variety of plant helps with better digestion, gets rid of urinary issues, helps with weight loss, and lowers blood pressure. In various traditional medical systems, *L. siceraria* has been used to cure human ailments and

disorders. This vegetable is low in calories and high in water content. Because the seeds have a cooling effect on the body, they are also used to treat headaches and constipation [15]. Fruit is used as resonance boxes for the kora and balafon (xylophone) once it has dried. Dried bottle gourd fruits are used for transportation and storage of drinking water, milk, liquor, local wine, oatmeal, food grains, animal fat, honey, tobacco, ghee, salt, perfume, medicinal herbs, and crop seeds. Dried fruit shells are used to make beehives, kegerators, and storage bins for clothes and silverware. Dried bottle gourds can be used to make a variety of musical instruments and lovely decorations [16]. When fruit dries, it is utilized as resonance boxes for the kora and balafon (xylophone). Drinking water, milk, alcohol, local wine, oatmeal, food grains, animal fat, honey, tobacco, ghee, salt, perfume, medicinal herbs, and crop seeds are among the items that are transported and stored in dried bottle gourd fruits. Beehives, kegerators, and storage containers for clothing and cutlery are all constructed from dried fruit shells. A multitude of musical instruments and beautiful decorations can be fashioned from dried bottle gourds [17].

Phytochemistry: The phytochemical test indicates that the extract contains proteins, carbohydrates, flavonoids, saponins, Steroids, Glycosides. This vegetable is low in calories and high in water content. The edible part contains proteins, terpenoids, flavonoids, vitamins, choline, and other phytochemicals. Numerous bioactive substances, such as flavones, sterols, cucurbitacins, C-glycosides, triterpenoids, and -glycosides, are present in *L. siceraria* [2, 18].

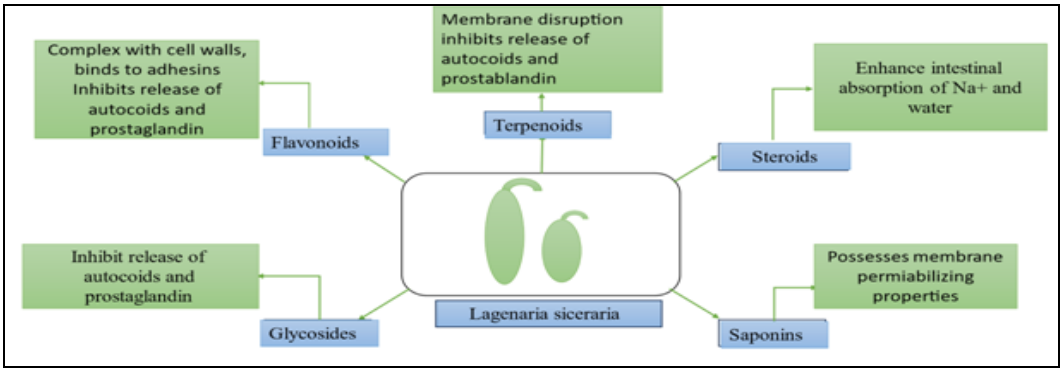

FIG. 3: BIOACTIVE COMPOUNDS ISOLATED FROM *LAGENARIA SICERARIA* AND THEIR MECHANISM OF ACTION

Nutrional Profile: 37.2–35.0 g/100 g crude protein, 8.1–7.3 g/100 g carbs, and 4.0 g/100 g moisture were all present in seeds [19].

Nutrients: The nutrient composition of *L. siceraria* (fruit and seeds) is given in **Table 3** [20].

TABLE 3: THE NUTRIENT COMPOSITION OF *L. SICERARIA* (FRUIT AND SEEDS)

Nutrients	Fruit (in 100 g of edible portion)	Seeds (100%)
Carbohydrate	2.5 g	45.93
Protein	0.2 g	8.93
Fat	1.0 g	38.92
Fibres	0.6 g	
Energy	12 calories	
Mineral	0.5 g	3.5
Moisture	96.1 g	2.72

The USDA (United States Department of Agriculture) nutritional database exhibited that each 100 g of *L. siceraria* has 14 Kcal energy, 3.39 g carbohydrates, 0.62 g protein, 0.2 g fat, and 0.5 g fiber [21].

Minerals: Calcium, Potassium, Magnesium, Lead, Iron, Sodium, Zinc, and chromium were found in the seeds of *L. siceraria* fruit. Furthermore, Phosphorus, Copper, Manganese, and Cobalt were also reported in this plant [22].

TABLE 4: MINERALS ASSOCIATED IN *L. SICERARIA*

Mineral	Value in mg
Sodium	2
Potassium	150
Magnesium	11
Copper	0.034
Phosporous	13
Calcium	26
Magnanese	0.089
Iron	0.20
Selenium	0.2
Zinc	0.70

Amino Acid: Alanine, leucine, isoleucine, aspartic acid, glycine, leucine, and aspartic acid were among the seventeen amino acids identified in the seeds of *L. siceraria*, along with proline, cysteine, glutamic acid, phenylalanine, arginine, tyrosine, histidine, valine, and serine with glutamic acid [3].

Significant Pharmacological Characteristics of Bottle Guard: Since, antiquity, conventional medicine has valued edible bottle guard for its tremendous health benefits. A variety of way bottle guard can improve human well-being depend on their biological components. A growing number of people are interested in extracting bioactive component from bottle guard to create functional food. Traditional medicines have employed bottle guard foe a very long time in many different forms. The use of phytochemical or bioactive compound from different bottle guard species as Anti-inflammotory, Anti-Cancer, Anti-Diabetes, Gastro-protective, Hepato protective, Cardio- protective, Anti-obesity, Anti-oxidant and more common around the world.

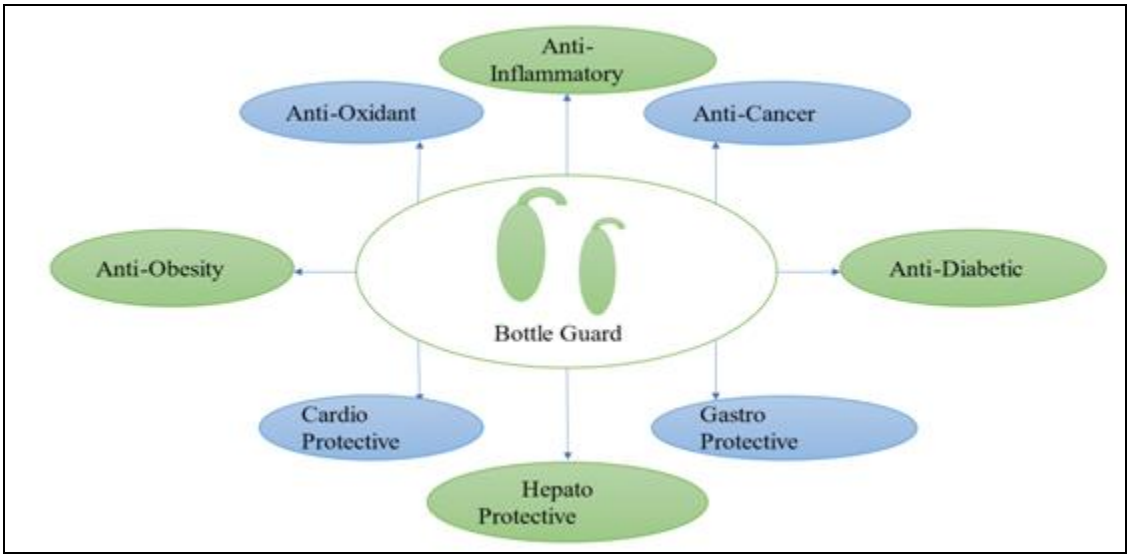

FIG. 4: THE MEDICINAL PROPERTIES OF BOTTLE GUARD

Effectiveness of Consumable Bottle Guard as an Achievable Anti-Inflammatory Treatment: The ethanolic extract of the fruit and leaves of *L. siceraria* was examined for its analgesic and anti-inflammatory effects in rats and mice. The extract's action was examined using acetic acid-induced writhing, tail immersion pain, and carrageenan-induced edema models. The extract demonstrated significant anti-inflammatory and analgesic activity in the writhing test. A phytochemical investigation has revealed that the extract contains flavonoids, carbohydrates, proteins, glycosides, and saponins [24].

Effectiveness of Consumable Bottle Guard as an Effective Anti-Oxidant Property: The potent scavenging properties of *L. siceraria's* aqueous extract and the high phenolic content of calabash fruit may mitigate the oxidative stress linked to diabetes [25]. Phenolics and flavonoids are known to possess antioxidant activity due to their exceptional ability to scavenge free radicals produced within human bodies. The quantity of phenolics and flavonoids in a plant sample can therefore be used to estimate the plant's antioxidant potential. *In-vitro* research was done to determine the antioxidant potential of the pedicles of *L. siceraria* fruits. The most potent DPPH radical scavenger was demonstrated by the ethyl acetate fraction, even at low concentrations [26].

A concentration-dependent methanol extract of *L. siceraria's* aerial portion has been shown to scavenge DPPH, hydrogen peroxide, superoxide radical, and nitric oxide *in-vitro*, in addition to preventing lipid peroxidation. MELS (methanol extract of aerial portions of *L. siceraria*) has a significant phenolic and flavonoid content, which is responsible for its antioxidant effect [27]. High levels of antioxidant activity were demonstrated in *in-vitro* tests using the reducing power assay, radical scavenging assay, superoxide scavenging assay, lipid peroxidation inhibition assay, and the ethyl acetate extract of bottle gourd. The amount of

phenolic compounds present in extracts from bottle gourds is directly correlated with their ability to scavenge radicals [28]. Glutathione peroxidase (GPx), catalase (CAT), superoxide dismutase (SOD), vitamin C (Vit C), glutathione reductase (GR), reduced glutathione (GSH), vitamin E (Vit E), and glutathione S-transferase (GST) were used to test the antioxidant capability of the extract in an isolated rat heart model. In rats given isoproterenol, the activity of antioxidant enzymes such CAT, GSH, GR, and SOD were markedly decreased. It is possible to conclude that the ethanolic extract of *L. siceraria* possesses antioxidant properties [29].

Using ethanol to extract seeds produced a large amount of phytochemicals and antioxidant activity. These potent reducing agents, metal chelators, and radical scavengers all of which are phytochemicals may be the cause of the high antioxidant activity of the seeds. In antioxidant experiments, the methanolic extract of seeds demonstrated good DPPH and radical scavenging properties [30]. The effects of fruit extract from *L. siceraria* were studied in humans with dyslipidemia. Superoxide dismutase and glutathione levels were shown to rise in dyslipidemic individuals, indicating the antioxidant activity of *L. siceraria* fruit extract [31].

Effectiveness of Consumable Bottle Guard as an Anti-Cancer Properties: The purpose of the study was to determine how *L. siceraria* aerial parts' methanol extract affected its anti-cancer qualities. Ehrlich's model of ascites carcinoma in mice. The investigation of tumor growth response, which comprised an extension of life, an analysis of hematological parameters, biochemical estimations, and an antioxidant assay of liver tissue, was used to evaluate the impact of drug response. *L. siceraria* possesses considerable anticancer activity, as evidenced by its cytotoxicity, antioxidant properties, and the amount of flavonoids in the methanol extract of its aerial parts [32]. Using human cancer cell lines, the anticancer efficaciousness of *L. siceraria* fruit was examined (MCF-7 and HT-29). The bitter component of *L. siceraria* exhibited significant anticancer effect against both cancer cell lines, albeit with varying potency and selectivity. Since cucurbitacin I and other bioactive components are present in *L. siceraria* fruit bitter extracts, it is possible that these compounds' presence contributed to the dose-dependent inhibitory and cytotoxic effects observed in the tested cell lines [33]. The anti-mutagenic qualities of a methanolic extract of *L. siceraria* Standley Fruit were examined. Plant extracts varied in their anti-mutagenicity from low to high. In this study, the antimutagenic effect of direct (Sodium azide) acting mutagens against *Salmonella typhimurium* strains TA98 and TA100 was evaluated using the Ames test. The TA98 and TA100 strains have significant antimutagenicity against mutagen, according to the study. Because of its anti-oxidant properties, the extract found in this study has been shown to have antimutagenic properties, indicating that *L. siceraria* Standley Fruit may have chemopreventive pharmacological significance [34].

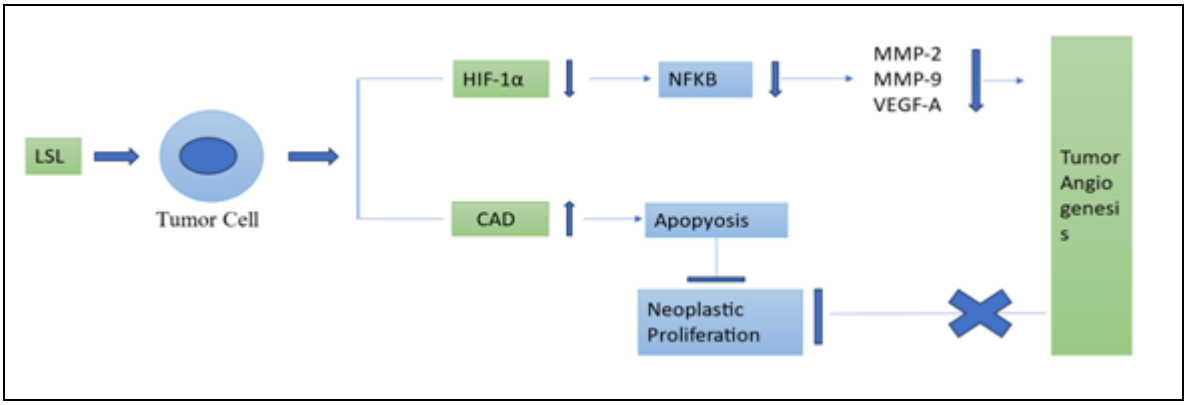

FIG. 5: ANTI-CANCEROUS MECHANISM OF ACTION OF *LAGENARIA SICERARIA*

The chemopreventive effectiveness of bottle gourd juice (BGJ) against the development of cutaneous papillomas was studied in Swiss albino mice. Histological studies and a decrease in papilloma quantity, multiplicity, incidence, latency, volume, and size were used to illustrate the chemopreventive qualities of bottle gourd against skin cancer. The protective effects could be

attributed to the presence of phytochemicals acting through several mechanisms [35, 36]. The cytotoxic effects of plant fruit extract were studied on lung cancer cell lines. The results showed that the extract of this plant included cucurbitacin, flavonoids, and lagenin, a polysaccharide inhibitor, which significantly inhibited the growth of the lung cancer cell line. The high lectin activity of the latex sap of dietary *L. siceraria* (LSL) induces immune-potentiating effect. LSL suppresses the development of tumor cells in both *in-vitro and in-vivo* tumor models. It targets apoptosis and tumoral neovasculature to decrease tumor growth by altered gene expression. **Fig. 5** provides information on its potential mode of action [37].

Effectiveness of Medicinal Bottle Guard as a Treatment for Anti-Obesity: The chloroform fraction of *L. siceraria* included a number of fatty acid esters, such as isopropyl palmitate, methyl ester of 9,12-octadecadienoic acid, methyl ester of hexadecanoic acid, and methyl ester of alpha-linolenic acid. These compounds give *L. siceraria* the capacity to suppress pancreatic lipase activity, which in turn lowers lipid breakdown and, ultimately, lowers the body's intake of fat. Therefore, it may be recommended to regularly consume the fruit's aqueous decoction in order to lose weight. Lipase was inhibited by fatty acids and their esters [38].

The synergistic effect of *L. siceraria* (fruit) extracts and Commiphora mukul (gum resin) was investigated in obese mice that were fed a high-fat diet. Following the combination treatment, there was a significant decrease in serum cholesterol, LDL, triglycerides, VLDL, fasting blood glucose, and body weight along with an increase in HDL levels. Combining C. Mukul with *L. siceraria* decreased obesity brought on by a high-fat diet, according to the results. Researchers looked into how L. siceraria fruit extract affected people with illnesses. The body mass index significantly decreased [39]. When Wistar albino rats were given a high-fat diet to induce obesity, and then given a diet containing *L. siceraria*, the rats' body weight, locomotor activity, total cholesterol, food intake, triglycerides, and organ weights all significantly decreased, and their levels of low- and high-density lipoprotein increased. These results suggest that *L. siceraria* may have anti-obesity properties.

The early phytochemical assessment of LS and TA revealed that the aqueous extract contained a variety of chemical components, including saponins, pectin, and ellagic acid, all of which are critical for lowering body weight and cholesterol levels. The LS fruits have been shown to have lipid-lowering qualities due to their high concentration of saponins, cucurbitacins B, G, D, H, triterpenoid, and pectin [40, 41]. Rats with hyperlipidemia brought on by Triton were used to examine the antihyperlipidemic and hypolipidemic effects of several bottle gourd extracts, as well as the hypolipidemic effects on rats with normal cholesterol levels.

The extracts significantly raised levels of high-density lipoproteins while decreasing levels of triglycerides, total cholesterol, and low-density lipoproteins in a dose-dependent manner. Petroleum ether extract had no discernible effects. The alcoholic and chloroform extracts significantly increased HDL and had greater effects on triglycerides, total cholesterol, and low-density lipoproteins than the other extracts [42]. Rats with hyperlipidemia brought on by a high-fat diet were used to investigate the antihyperlipidemic effects of a methanolic extract of *L. siceraria* fruits (LSFE). The weight gain in rats given LSFE was less than that of rats on a high-fat diet.

Additionally, bile acid excretion increased significantly as a result of LSFE. It might function by increasing the excretion of cholesterol end products and influencing the liver's endogenous synthesis of cholesterol. Preliminary phytochemical screening identified flavonoids, polyphenolics, steroids, and saponins as components of the LSFE. Numerous studies have demonstrated the hypolipidemic and antihyperlipidemic effects of plant steroids and saponins [43]. All the active ingredients that prevent fat from accumulating in adipose tissue are present in the juice of L. siceraria, also known as bottle gourd. The ability of L. siceraria (bottle gourd) juice to reduce obesity in humans has been studied on overweight and obese subjects. Bottle gourd juice is a safe and effective therapy option for obesity, as evidenced by the considerable reductions in weight, waist circumference, and BMI observed in those who ingested it [44].

Effectiveness of Medicinal Bottle Guard as an Excellent Anti-Diabetic Substance: The fruit pedicles of *L. siceraria* exhibit notable alpha-amylase inhibitory activity when dissolved in water. This workout is used to control blood sugar levels. In the small intestine, pancreatic alpha-amylase blockage slows the conversion of starch to glucose. Because of this, it produces less glucose and enters the bloodstream, making it suitable for use as an anti-diabetic medication. By increasing antioxidant status and improving lipid metabolism, MELS supplementation reduces the consequences of diabetes by preventing the development of atherosclerosis in diabetic rats and lipid peroxidation. Because of this, and perhaps because of the extract's flavonoid and polyphenolic content, the aerial parts of *L. siceraria* methanol extract can be regarded as a rich source of anti-diabetic medications [45].

The functional state of pancreatic cells was altered by *L. siceraria* pulp and seed extracts. In rats with diabetes brought on by alloxan, the body's ability to produce and release insulin increased as blood glucose levels decreased. It has been demonstrated that *L. siceraria* pulp and seed extract have strong anti-diabetic effects [46]. The hypoglycemic properties of several globulins recovered from male Wistar rats were evaluated using the oral glucose tolerance test, which demonstrated the presence of globulins with strong anti-hyperglycaemic activity in *L. siceraria* seeds. A noticeable protein band with a molecular weight of 24.61 kDa and strong anti-hyperglycaemic effects was seen in the profile. If this particular protein is present, it is most likely the active peptide that causes the activity that has been seen [47].

The effects of fruit extract from *L. siceraria* were studied in humans with dyslipidemia. Significantly reduced blood glucose levels were observed after fasting. Several *in-vitro* methods, including glucose adsorption diffusion capacity and amylolysis kinetics, were employed to evaluate the phytomaterial extracts' hypoglycemic effectiveness. The slowing of glucose diffusion was attributed to *L. siceraria* suppressing an enzyme (alpha-amylase), which limits the conversion of starch to glucose. Several in-vitro investigations have demonstrated the hypoglycemic activity of *L. siceraria* extracts, suggesting that they could be used as therapeutic agents to treat diabetes [48]. The remarkable antidiabetic activity seen in the ethanol and methanol seed extracts of *L. siceraria* may be explained by the presence of bioactive compounds, cholinergic esterase enzymes, amylase and glucosidase inhibitors, andmethanol seed extracts of *L. siceraria* might explain the excellent antidiabetic action found [49].

Efficacy of Bottle Guard that are Edible as a Potential Drug for Medical Management of Cardio-Protective: There is a cardioprotective effect of ethanolic extract. The ability of *L. siceraria* (Mol) fruits to neutralize free radicals or to sustain the almost normal activity of these enzymes, which shield the heart membrane from oxidative damage by reducing lipid peroxidation, is most likely the source of their antioxidant action. Research on modern pharmacology has shown that the fruit of *L. siceraria* possesses a range of cardioprotective properties. Chloroform and alcoholic extracts of *L. siceraria* showed antihyperlipidemic potential in rats with triton-induced hyperlipidemia. The fruit showed significant cardioprotective advantages in rats exposed to isoproterenol and doxorubicin-induced cardiotoxicity. The study's objective was to determine whether *L. siceraria* (LS) fruit powder could shield rats from the cardiotoxicity of the medication doxorubicin (Dox). Histopathological study demonstrated protection against doxorubicin-induced heart damage in the LS-treated group. When rats were exposed to doxorubicin-induced cardiotoxicity, it was found that *L. siceraria* had a cardioprotective effect [33, 50].

The plant's cardioprotective qualities were demonstrated by the absence of inflammation and cardiac necrosis in the group treated with L. *siceraria.* fruit powder contains antioxidants called orientin and isoorentin, which may help shield the heart from inflammation and necrosis. As a result, it may be assumed that LS fruit has cardioprotective characteristics [51]. *L. siceraria* (Cucurbitaceous) Fruit Juice decreased Doxorubicin-induced cardiotoxicity and myocardial damage in the rat heart by maintaining endogenous antioxidants and lowering lipid peroxidation [52]. The potential cardioprotective effects of *L. siceraria* fruit juice were studied in isoproterenol-induced myocardial infarction.

The findings indicate that in rats with myocardial infarction caused by isoproterenol, fruit juice from *L. siceraria* has a cardioprotective effect. These effects could be caused by the polyphenolic components found in LS fruit [53]. Giving *L. siceraria* fruit powder reduced the amount of tachycardia brought on by isoprenaline. In mice treated with LS, the cardiotoxic effect of isoprenaline was lessened. Antioxidant and anti-inflammatory characteristics of LS appear to contribute to its cardioprotective impact in isoprenaline-induced cardiotoxicity [54].

Relevance of Bottle Guard as a Successful Gastro-Protective Properties: Wistar rats were used to test the anti-ulcer effects of a methanolic extract of *L. siceraria* fruits utilizing models of ethanol ulcer, cold-restraint stress, pylorus ligation, and Asprin. MELS dramatically decreased total acidity, free acidity, ulcer index, and stomach volume, suggesting that *L. siceraria* fruit extract may have anti-ulcer properties [55]. While total acidity, gastric content, and gastric juice volume all reduced, *L. siceraria* demonstrated an increase in the pH of gastric juice. Histological assessment studies have demonstrated that *L. siceraria* is a safe and efficient treatment for stomach ulcers [56].

Considerable Hepato-Protective Properties of Bottle Guard: Improvements in antioxidant parameters, serum marker enzyme levels, and histological studies support the claim that the ethanolic extract of *L. siceraria* fruit has a strong hepatoprotective and antioxidant effect when antitubercular medications induce hepatotoxicity [57]. It has been demonstrated that *L. siceraria* prevents both the histology of the liver tissue in rabbits showing neither cholestasis or necrosis, and the rise of hepatic enzymes brought on by long-term carbamazepine administration. Consequently, it can be said that *L. siceraria* prevents liver damage and lessens the hepatotoxicity brought on by carbamazepine [58]. The hepatoprotective effectiveness of fruit extracts from *L. siceraria* against hepatotoxicity produced by carbon tetrachloride (CCl4) was assessed in rats. After rats were treated with *L. siceraria* ethanol extract, the harmful effect of CCl4 was significantly decreased by raising serum bilirubin, protein, and enzyme levels. The hepatoprotective activity of the extracts was further established by the presence of normal hepatic cords, absence of necrosis, and fatty infiltration in the liver sections of the animals treated with them. The presence of phenolic components in the ethanol extract of *L. siceraria* fruit protected against oxidative damage and liver necrosis in rats exposed to paracetamol-induced hepatotoxicity [59].

The Impact of *L. siceraria* on Several Human Bodily Systems: Fruit juice from *L. siceraria* (LS) has been utilized to treat liver issues and jaundice. The fruit, especially when prepared as a syrup from delicate fruits, is used to treat bronchial issues, asthma, discomfort, ulcers, and fevers. It is also used to cure chest coughs. There have also been claims made for the plant's antioxidant, cardioprotective, hypolipidemic, diuretic, antihypertensive, hepatoprotective, analgesic, anthelmintic, immunosuppressive, central nervous system stimulant, laxative, and adaptogenic qualities [60].

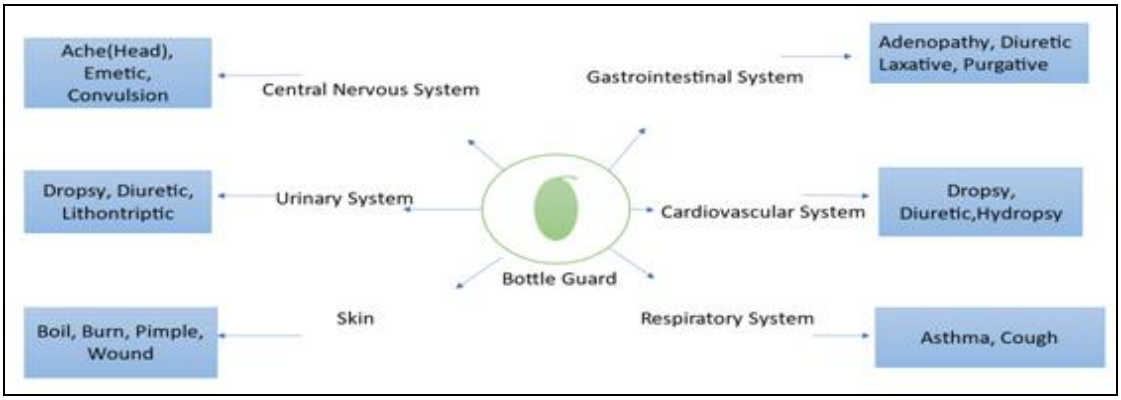

FIG. 6: THE EFFECT OF BOTTLE GUARD ON MULTIPLE SYSTEMS OF HUMAN BODY

The herb also possesses cytotoxic, expectorant, antitussive, and anti-inflammatory properties. This variety of plant helps with better digestion, gets rid of bladder problems, helps with weight loss, and

lowers blood pressure. Because the seeds have a cooling effect on the body, they are used to cure constipation and headaches. The herb has long been known for its therapeutic properties, and it has been used to treat a wide range of illnesses, such as ulcers, diabetes, hypertension, piles, jaundice, colitis, and skin infections. Its fruit pulp is employed as a purgative and emetic and has cooling, diuretic, antibilious, and pectoral properties. This pulp is used to cure insomnia and rheumatism by boiling it in oil [61, 62].

CONCLUSION: As people become more aware of the possible side effects of synthetic medications and health supplements, they are searching increasingly for naturally occurring chemicals that have health benefits. Following careful analysis, it was discovered that bottle guards have outstanding nutritional value in addition to potential medical benefits. As vegetables in terms of nutrition, all varieties of bottle guard offer a good amount of carbohydrates, protein, unsaturated fatty acids, fiber, and certain important vitamins. While bottle guards are widely recognized for their culinary and nutritional qualities, little is known about their possible medical uses. It has been shown that Bottle Guard possesses anti-inflammatory, anti-tumor, cardioprotective, gastroprotective, hepatoprotective, anti-obesity, anti-diabetic, and antioxidant properties. Subsequent research endeavors ought to prioritize ascertaining the exact mechanism of action for several biochemical formulations and bioactive substances. This review study will be very helpful to researchers, healthcare professionals, and scientists who work in the pharmaceutical research and medication development fields, as well as those who work in the healthcare industry. In addition to being a great source of bioactive substances for medical and therapeutic purposes, bottle guard is a food that is both nutritious and functional. The data in this analysis may potentially serve as a springboard for more research, testing, and the commercialization of this novel.

Declarations:

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