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A REVIEW: INTRODUCTION OF LUFFA CYLINDRICAL WITH PHARMACOLOGICAL ACTION

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ABSTRACT

Luffa cylindrica is an important for the treatment of various type of diseases. Also it is an edible vegetable in India also other country. Luffa Cylindrica is a used for the Treatment of Nasal Swelling and Sinus Problems. Gourds produce long, cylindrical fruits, 10–40 cm in length and 6–10 cm in diameter. It also helps to remove the buildup of dead skin cells accumulated over the surface of your skin. Intraperitoneal administration of water decoction of Sigualuo inhibited carrageenan induced plantar edema in rats. It has carried out phytochemical screening and Anti-inflammatory, Bronchodilator. The preliminary phytochemical screening of Luffa cylindrica revealed that the plant contained anthocyanins, glycosides, flavonoids, triterpenoid, cardiac glycosides, saponins, carbohydrates, proteins, alkaloids, and tannins. The seeds of the plant contained crude protein 33.55±1.01 %, fiber 6.47±0 %, fat 22.17±0.28 %, carbohydrate 29.51±1.83 %. evaluated methanolic extract of Luffa cylindrica fruits for its antihyperglycemic potential in Swiss albino mice. Antihyperglycemic activity was evaluated through oral glucose tolerance test (OGTT) in glucose-loaded mice. In antihyperglycemic activity tests conducted with glucose-loaded Swiss albino mice, methanolic extract of fruits significantly and dose-dependently reduced blood glucose concentrations. Oral administration of the petroleum ether fraction of the ethanol extracts of fruits, leaves and stems potentiated the cytophagic action and acid phosphatase activity of peritoneal macrophages in mice.

KEYWORDS: Antihyperglycemic activity was evaluated through oral glucose tolerance test (OGTT) in glucose-loaded mice.

INTRODUCTION

Luffa cylindrica (L.) commonly called sponge gourd, loofa, vegetable sponge, bath sponge or dish cloth gourd, is a member of cucurbitaceouse family. The fruits of Luffa cylindrica are smooth and cylindrical shaped. One mature Luffa sponge will produce at least 30 seeds. Some will produce many more.[1]

Luffa cylindrica is an important edible and medicinal plant that belong to the Cucurbitaceae family. It has many common names including smooth luffa, sponge luffa, vegetable sponge gourd, climbing okra, dishcloth gourd, and Chinese okra.[2]

Figure: Mature Luffa cylindrical and Sponge.

Medicinal use of Luffa cylindrical the mature fruit is allowed to dry, a fibrous, sponge-like structure remains. The fibers can be boiled in water, which is then used as medicine. Luffa is taken by mouth for treating and preventing colds. It is also used for nasal swelling and sinus problems.[3]

They are annual and largely monoecious, bearing ridged, and smooth fruits respectively. Immature loofah fruits are used as vegetables and mature fruits are used for fiber. Gourds produce long, cylindrical fruits, 10–40 cm in length and 6–10 cm in diameter.[4]

Loofahs are a good source of carbohydrates, vitamin C, and minerals; the fibres are used for industrial purposes. Luffa cylindrica, Luffa acutangula, Luffa echinata and Luffa graveolens are the important species of Luffa; the first two are commercially grown in several countries and are of economic importance.[5]

Loofahs that originate from the luffa plant have a number of skincare benefits. With its fibrous texture, it gently exfoliates the skin without scratching it or causing irritation caused by harsh chemicals. It also helps to remove the buildup of dead skin cells accumulated over the surface of your skin.[6]

Taxonomy of Luffa cylindrica Linn.

Kingdom :	Plantae
Division :	Mangoliophyta
Class :	Mangoliosida
Order :	Cucurbitales
Family :	Cucurbitaceae
Genus :	Luffa
Specie :	Cylindrica

Physicochemical properties: The physicochemical properties of the seed oils were: oil yield (%): 19-25, density (g/cm3): 0.91, specific gravity: 0.92, iodine value (%): 102.67-130, saponification value (mgKOH): 108.23-168, free fatty acid (%): 10.36, acid value (%): 20.62-68.71, unsaponifiable matter (%): 3.98, peroxide value (meq/kg): 280, moisture content (%): 4.62, colour of oil: yellowish green, texture of oil: very viscous, fragrance: sweet fruity.[7]

Chemical constituents: The preliminary phytochemical screening of Luffa cylindrica revealed that the plant contained anthocyanins, glycosides, flavonoids, triterpenoid, cardiac glycosides, saponins, carbohydrates, proteins, alkaloids, and tannins. The seeds of the plant contained crude protein 33.55±1.01 %, fiber 6.47±0 %, fat 22.17±0.28 %, carbohydrate 29.51±1.83 %. The mineral contents were: calcium 14.29, zinc 2.34, magnesium 21.40 and phosphorus 0.42 g/100 g. However, Osuagwu and Edeoga found that the percentage of carbohydrate was 70.54%, crude protein 0.36%, crude fiber 29%, ash 0.15%, moisture content 0.73% and fat content 0.006% of the seeds of Luffa cylindrica. While, the percentage of carbohydrate was 87.49%, crude protein 0.3%, crude fiber 12%, ash 0.23%, moisture content 0.19% and fat content 0.006% of the leaves of Luffa cylindric, and the percentage of carbohydrate was 71.84%, crude protein 25 %, crude fiber 27%, ash 0.9%, moisture content 0.34% and fat content 0.006% of the fruit pericarp of Luffa cylindrica. Three protein-synthesis inhibitory proteins (PSIs) were isolated from the seeds of Luffa cylindrica, they have molecular masses of 19 kDa, 15 kDa, and 9 kDa, and were designated 19K-PSI, 15K-PSI, and 9KPSI, respectively. The amino acid composition of 19K-PSI was: Ser27Glx3Gly164Tyr7Lys9His6, and that of 9K-PSI was: Asx3Glx25Pro2Gly5Lys2His2Arg25Trp3. The proteins luffin-a, luffin–b, luffin P1 and

luffacyclin, were isolated from the seeds of Luffa cylindrica. The total amino acid contents of Luffa cylindrica seed flour were 72.71 g/100g. Amino acid consisted of essential amino acid: lysine 5.08, histidine 2.21, arginine 9.75, threonine 2.26, valine 4.19, methionine 2.14, isoleucine 3.58, leucine 5.35 and phenylalanine 4.20 g/100g; while the non-essential amino acids were consisted of aspartic acid 10.02, serine 3.20, glutamic acid 12.27, proline 2.85, glycine 0.98, alanine 3.34, cystine 0.66 and tyrosine 0.63 g/100g. The total saturated fatty acids concentration in the seed flour was 33.07%, total monounsaturated fatty acids 14.90%, and total polyunsaturated fatty acids 52.02%. Linoleic acid (31.47%) was the most predominant in the Luffa cylindrica seed flour oil(54). The total cucurbitacins in the fruit of Luffa cylindrica was 3.91±0.2% (w/v)(62). Phenolics and flavonoids were predominant in the aqueous extract of peel, while oleanolic acid, carotenoids and chlorophylls were dominated in ethyl acetate extracts of peel. Total phenolic contents of different Luffa extracts [water extract of peel (PW), ethyl acetate extract of peel (PA), water extract of pulp (WP), ethanol extract of pulp (EP), ethyl acetate extract of pulp (AP)] were 14.02±0.80, 11.24±0.31, 1.11±0.01, 0.94±0.09 and 4.18±0.19 mg/g extract respectively. The total flavonoids contents were 16.74±0.50, 7.21±0.00, 0.22±0.00 and 0.33±0.00 mg/g extract in the PW, PA, WP and EP respectively. The total carotenoids contents were 14.87±1.42, 0.01±0.00 and 0.65±0.02 mg/g extract in PA, EP and AP respectively, while, the total chlorophylls contents were 37.29±0.16, 0.04±0.00 and 1.60±0.01 mg/g extract in PA, EP and AP respectively. However, Azeez et al., found that the total phenol content in various extracts of pulp and peel of the plant was in the range of 0.94-14 mg GAE/g. The plant contained 20.74 mg/g as a total phenolics, 17.94 mg/g as a total flavonoids, 0.5 mg/g as a total anthocyanins, and 1.2 mg/g as an ascorbic acid. Many polyphenolic compounds included: p-coumaric acid; 1-O-feruloyl-β-d-glucose; 1-O-pcoumaroyl-β-d-glucose; 1-O-caffeoyl-β-d-glucose; 1-O-(4-hydroxybenzoyl) glucose; diosmetin-7-O-β-dglucuronide methyl ester; apigenin-7-O-β-d-glucuronide methyl ester; and luteolin-7-O-β-d-glucuronide methyl ester were isolated as hydrophilic antioxidant constituents from the fruits of Luffa cylindrica. The total amount of the eight compounds in the dried gourds without skin was about 1%. A flavone glycoside, the methyl ester of diosmetin 7-O-beta-D-glucuronide was isolated from the fruits of Luffa cylindrica. Saponins: saponins of oleanolic acid, gypsogenin, gypsogenin lactone, aegyptinin A, aegyptinin B, ginsenosides-Re, ginsenosides-Rg1, lucyoside 1, 3-0-B-D-glucopyranosyl hederagenin, 3-0-B-Dglucopyranosyl oleanolic acid and lucyosides A to P were extracted from different parts of Luffa cylindrica. Two Triterpenoids (sapogenins 1 and 2) isolated from Luffa cylindrica showed immunomodulatory effects. Echinocystic acid, a triterpenoid sapogenin was also

isolated from Luffa cylindrica. 3-hydroxy-1-methylene-2,3,4,4-tetrahydroxynapthalene-2-carbaldehyde and 22,23-dihydroxy spinasterol were isolated from petroleum ether extract of the fruits of Luffa cylindrical.[8,9,10]

Pharmacological effects

1. **Antiinflammatory, analgesic and antipyretic effects:** Intraperitoneal administration of water decoction of Sigualuo inhibited carrageenan induced plantar edema in rats. P Muthumani et al has carried out phytochemical screening and Anti-inflammatory, Bronchodilator and Antimicrobial activities of the seeds of Luffa cylindrica and concluded all the extracts revealed the presence of sugar, protein, alkaloids, flavonoids, sterols and glycosides as major constituents. Cu-1 is oil has shown more unstauration and less acid value which has been hydrolyzed and the resulting free fatty acids have been converted into their respective methyl esters for separation on GLC. CU-2 this is the unsaponifiable fraction of the oil. The sterols or related compounds are present in this fraction as the chemical and spectral data suggests. This showed very high antifungal and significant anti-bacterial activity. CU-3 has significant anti-inflammatory activity. CU-4 showed bronchodilator activity. This extract showed very high degree of antifungal activity.[11]
2. **Anti-hyperglycaemic:** Evaluated methanolic extract of Luffa cylindrica fruits for its antihyperglycemic potential in Swiss albino mice. Antihyperglycemic activity was evaluated through oral glucose tolerance test (OGTT) in glucose-loaded mice. In antihyperglycemic activity tests conducted with glucose-loaded Swiss albino mice, methanolic extract of fruits significantly and dose-dependently reduced blood glucose concentrations. At extract doses of 100, 200 and 400 mg per kg body weight mice, the percent lowering of blood sugar by the extract was, respectively, 11.8, 23.8, and 32.7. The extract, when administered at a dose of 50 mg per kg body weight lowered blood glucose level by 4.9%, but the result was not statistically significant. A standard antihyperglycemic drug, glibenclamide, when administered to glucose-loaded mice at a dose of 10 mg per kg body weight, reduced blood sugar levels by 32.7%. Thus at the highest dose of the extract (400 mg), the percent lowering of blood sugar was directly comparable to that of glibenclamide.[12]
3. **Antifungal:** Aboh et al. evaluated in vivo antifungal (dermal) activity of the crude ethyl acetate extract, revealed a gradual healing of the infected rats skin upon treatment with the extract formulation, with no visible clinical signs of toxicity to the skin. In vivo

systemic antifungal evaluation of the crude extract at a dose of 1500 mg/kg produced the strongest systemic antifungal activity with a total kill of all the fungal isolates at day 3 of treatment in rats however, histopathological examination after oral administration revealed signs of toxicity to vital organs (kidney, liver and lungs.[13]

4. **Wound healing and Anti-inflammatory:** Abirami et al. aimed to investigate the wound healing and anti-inflammatory activity of chloroform extract of whole plant of Luffa cylindrica by hot percolation method. The wound healing activity was evaluated by excision wound model. A maximum wound healing activity was found in chloroform extract Luffa cylindrica in comparison with standard. The anti-inflammatory activity was evaluated using carrageenan-induced rat paw edema method in rats. The effects of the administration of reference standard (Ibuprofen at the dose 10mg/kg) were also evaluated. The chloroform extracts of Luffa cylindrica at the dose level of 25 and 50 mg/kg, p.o. were tested. Treatment with chloroform extract of Luffa cylindrica at the dose of 50 mg/kg had showed significant ($p<0.01$) inhibition of carrageenan induced rat paw edema than that of rats were received 25mg/kg. The results obtained indicate that chloroform extracts of Luffa cylindrica has wound healing and anti-inflammatory activities that supports the folk medicinal use of the plant.[14]
5. **Immunostimulation:** Oral administration of the petroleum ether fraction of the ethanol extracts of fruits, leaves and stems potentiated the cytophagic action and acid phosphatase activity of peritoneal macrophages in mice.[15]
6. **Anti-asthma, anti-tussive and expectorant effects**: Oral and Intraperitoneal administration of water decoction and ethanol extracts of Sigualuo suppressed SO2- and ammonium aerosol-induced cough in mice, and increased the respiratory tract phenol red excretion in mice. In guinea pigs, intraperitoneal administration of water decoction of Sigualuo inhibited histamine induced asthma.[16]
7. **Hepatoprotective effect:** The hepatoprotective activity of the ethanol and aqueous extracts (100 and 200 mg/kg) of fruit of Luffa cylindrica were tested against paracetamol induced hepatotoxicity in rats. Treatment with ethanol and aqueous extracts of fruit of Luffa cylindrica showed significant hepatoprotective effect as determined by biochemical parameters and also supported by histopathological study.

Methanolic extract of Luffa cylindrica leaves was evaluated for its hepatoprotective potential against paracetamol intoxicated rats. The methanolic extract showed significant ($p< 0.05$) hepatoprotective protection in rats based on biochemical parameters (serum glutamate

oxaloacatate transaminase, serum glutamate pyruvate transaminase, alkaline phosphatase, bilirubin and some serum antioxidant enzymes). Lipid peroxidation level was decreased significantly and SOD, GSH and catalase levels were increased significantly ($p< 0.001$) after treatment with the methanolic extracts 250 mg/kg and 500 mg/kg. The hepatoprotection of Luffa cylindrica was investigated against erythromycin toxicity in male rats. Oral daily administration of toxic dose of erythromycin estolate (100 mg/kg) was given to rats for fourteen days to induce hepatotoxicity. The hepatotoxicities were monitored by increased level of serum glutamate pyruvate transaminase, serum glutamic oxaloacetic transaminase, alkaline phosphatase and total bilirubin. The administration of hydroalcoholic extract of leaves of Luffa cylindrica (250, 500 and 1000 mg/kg bw) was significantly prevented the occurrence of liver damage. Furthermore, the administration of hydroalcoholic extract of leaves of Luffa cylindrica restored the hepatic antioxidant status. The biochemical results were further confirmed by histopathological examination of the liver.[17]

8. **Antiemetic effect:** The ethanol extract of Luffa cylindrica fruit peel was evaluated for antiemetic effect using chick emesis model. The anti-emetic effect was determined by calculating the mean decrease in number of retching in contrast with those of control after 10 minutes of copper sulfate (50mg/kg orally) administration. The antiemetic effect was achieved at a dose of 150 mg /kg bw ($p< 0.001$).[18]
9. Antidiabetic Activity Ancient literature reported the use of fruit juice in an adrenal variety of diabetes. Various studies have been performed to prove antidiabetic effect of the plant. Hypoglycemic activity of ethanolic extract (95%) of *Cucumis sativus*, *Lagenaria siceraria*, and *Luffa acutangula* fruit was evaluated in Long Evans female rat against alloxan monohydrate. After 12 h, all the extracts (200 mg/kg i.p.) reduced fasting blood glucose level by 67.38, 65.39, and 51.10%, respectively. Reduced glycogen content (75.32%) of the diabetic rat was attenuated by treatment with *Luffa acutangula* (149.35%) ethanolic extract.[19]
10. **Antihyperlipidemic Activity:** compared the lipid-lowering effect of ethanolic extract (95%) of *Cucumis sativus*, *Lagenaria siceraria*, and *Luffa acutangula* fruit against alloxan monohydrate in Long Evans female rats. Extract significantly reduced total cholesterol (TC), TG, and low-density lipoprotein (LDL) levels by 38.38, 79.64, and 85.66%, respectively, in the serum of rat.[20]
11. **CNS Depressant Activity:** examined CNS depressant activity of ethanolic fruit extract (5 and 10 mg/kg, p.o.) in Swiss mice. The dose of the extract was safe up to 50 mg/kg treatment without any morbidity. CNS depressant activity was evaluated using behavioral

changes, exploratory activity and barbiturates sleeping time animal models. The result of the study showed that CNS depressant activity of extract is dose dependant. More *in vitro* and *in vivo* studies should be performed to confirm the CNS depressant action of plant.[21]

CONCLUSION

Luffa cylindrica, beyond its common use as a natural scrubber, holds significant promise in the field of pharmacology. Its traditional uses have laid the groundwork for modern research, which has begun to uncover a variety of bioactive compounds with potent pharmacological activities. Antioxidant, anti-inflammatory, antimicrobial, antidiabetic, anticancer, and hepatoprotective properties make Luffa cylindrica a potential source for developing new therapeutic agents. However, further research, including clinical trials, is necessary to fully understand its efficacy and safety for medicinal use.

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