

Protective Role of *Luffa Cylindrica*

V.Sutharshana
Saveetha Dental College
Chennai, india

Abstract:

Medicinal plants play a vital role in treating several diseases. Sponge-gourds, the fruit of *Luffa cylindrica*, are widely used throughout the world. It is an annual climbing crop which produces fruit containing fibrous vascular system. It is considered as an important medicinal plant.

Keywords: *luffa cylindrica*, cultivational crops, medicinal properties.

INTRODUCTION:

Loofa is derived from the cucumber and marrow family and originates from America [1]. *Luffa* [*Luffa cylindrica* (L.) Roem syn *L. aegyptiaca* Mill] commonly called sponge gourd, loofa, vegetable sponge, bath sponge or dish cloth gourd, is a member of cucurbitaceae family. The number of species in the genus *Luffa* varies from 5 to 7. Only 2 species *L. cylindrica* and ribbed or ridge gourd [*L. acutangula* (L.) Roxb] are domesticated. 2 wild species are *L. graveolens* and *L. echinata*. *Luffa* is diploid species with 26 chromosomes ($2n = 26$) and a cross-pollinated crop (Bal et al., 2004). Loofa sponge is a lignocellulosic material composed mainly of cellulose, hemicelluloses and lignin [2]. The fibers are composed of 60% cellulose, 30% hemicellulose and 10% lignin [1]. The fruits of *L. cylindrica* are smooth and cylindrical shaped [1]. 1 mature *Luffa* sponge will produce at least 30 seeds. Some will produce many more [3].

MEDICINAL PLANTS-USES:

A wide variety of plants contain proteins that inhibit protein synthesis. The group of these inhibitors most extensively studied is that of the ribosome-inactivating proteins (RIP), having molecular masses of about 30 kDa [4]. Besides the RIPs named luffins have so far been isolated and characterized [5,6], polypeptides of about 5 kDa molecular mass, such as thionins [7], have been reported to inhibit cell-free protein synthesis, probably by a nonenzymatic mechanism. The physiological functions of these protein synthesis inhibitors (PSI) from plants are not known. However, they have been attracting much interest for their use to prepare immunotoxins by conjugation to monoclonal antibodies specific for cell-surface antigens [8].

The isolation and some properties of 3 new PSIs in *L. cylindrica* seeds have been reported. The results indicated that 3 new PSIs purified from *L. cylindrica* seeds structurally had no relation to luffin, a ribosome inactivating protein (RIP) which is a specific RNATV-glycosidase. 2 of them had unusual amino acid compositions and the other appears to be a nuclease. The physiological functions of these PSIs are not obvious, although it is an attractive hypothesis that these proteins may act in regulation of protein synthesis or in defense from some parasite [9].

In oriental medicine, *L. cylindrica* has effect on the treatment of fever, enteritis and swell etc. The extracts from vines alive are used as an ingredient in cosmetics and medicine [10]. They are used for bathing, removing toxins and regenerating the skin. They help varicose veins and cellulite by stimulating circulation. Immature fruit is used as vegetables, which is good for diabetes (Bal et al., 2004).

It has long been used as medicinal herb to treat asthma, intestinal worms, sinusitis [11, 12], edema, pharyngitis and rhinitis [13]. Leaves are used in amenorrhea, decayed teeth, parasitic affections, skin diseases [14], chronic bronchitis [13] pain, inflammation, carbuncles, abscesses, [15]. Stem is used in respiratory complaints [14] fruits in hemorrhage from bowels or bladder, hernia, hemorrhoids, jaundice, menorrhagia, scarlet fever [14], bronchitis, haematuria, leprosy, spleenopathy and syphilis [16]. Flowers are effective in migraine [13].

LUFFA-DESCRIPTION:

L. cylindrica has alternate and palmate leaves comprising petiole. The leaf is 13 and 30 cm in length and width respectively and has the acute-end lobe. It is hairless and has serrated edges. The flower of *L. cylindrica* is yellow and blooms on August-September. *L. cylindrica* is monoecious and the inflorescence of the male flower is a raceme and one female flower exists. Its fruit, a gourd, is green and has a large cylinder-like shape. The outside of the fruit has vertical lines and a reticulate develops inside of the flesh. *L. cylindrica* grows about 12 cm long. The stem is green and pentagonal and grows climbing other physical solid [10]. The loofa sponge is a highly complex macroscopic architectural template, an inexpensive and sustainable resource. The loofa sponge is cultivated, unlike the sponge produced with cellulose that is extracted from trees. The plant is cultivated in many countries, including Brazil, where its cultivation has an increasing economic importance [1].

PHYTOCHEMICAL PROPERTIES:

Phytochemically, leaves contain flavonoids [17], saponins [18] and triterpenes [19] where as in fruits ascorbic acid, anthocyanins, flavonoids [20], triterpenoid saponins [21] are present. The flowers are rich in flavonoids [17], carotenoids, flavonoids and oleanolic acid were found in the peel [22] where as polypeptides are reported in Seeds [23].

PROPERTIES:

Pharmacologically, anti-tussive, anti-asthmatic, cardiac stimulant, hepatoprotective, hypolipidemic properties [21], analgesic [26], anti-inflammatory [23, 24, 25] and anti-emetic activities [25] are reported.

ANTI-EMETIC ACTIVITIES:

The ethanol extract of fruit peel of *Luffa cylindrica* showed significant ($p < 0.001$) anti-emetic effect in young chicks. The protective effect of the extract against copper sulfate induced retching in young chicks is possibly by peripheral action as the oral copper sulfate induces emesis by peripheral action through excitation of visceral afferent nerve fibers of the GIT [27]. It has also been established that the peripheral 5-HT₃ [28], 5-HT₄ [29] or NK1 [30] receptors are involved in emesis. Therefore, it may be said that the ethanol extract of *Luffa cylindrica* fruit peel produced anti-emetic activity by receptor antagonism and has peripheral anti-emetic action.

Anti-emetic activity by using copper sulfate proposed 5-HT₃ [28], 5-HT₄ [29] or NK1 [30] receptors antagonism. Therefore it may be said that the extract was able to effectively prevent its effect and has a peripheral anti-emetic action.

ANTI-INFLAMMATORY ACTIVITY:

The anti-inflammatory effect of plant extracts and natural products are frequently assessed by carrageenan-induced paw edema [31]. Edema development in carrageenan-induced paw edema model in rats is represented by two phases [32]. The first phase occurs within an hour of carrageenan injection and is partly due to the trauma of injection and also due to release of histamine and serotonin [33]. Where as arachidonate metabolites (prostaglandins, leukotrienes) play a major role in the development of the second phase of reaction that is measured around 3- hours time [32,33]. The presence of prostaglandins in the inflammatory exudates from the injected foot can be demonstrated at 3- hour and period thereafter [33]. Non-steroidal anti-inflammatory agents inhibit cyclooxygenase (COX-2) enzymes involved in prostaglandin synthesis [34]. Based on these reports it is possible that the inhibitory effect of fruit peel of *Luffa cylindrica* (L.) Roem., on carrageenan-induced inflammation in rats could be due to inhibition of cyclooxygenase leading to inhibition of prostaglandin synthesis. Although the cyclooxygenase and lipoxygenase pathways are both involved in the inflammatory process, inhibitors of cyclooxygenase are more effective in inhibiting carrageenan-induced inflammation than lipoxygenase inhibitors [35]. In our experiment, rats pre-treated with *Luffa cylindrica* (L.) Roem., showed a significant edema inhibitory response at 5th hour following carrageenan injection. This result suggests that *Luffa cylindrica* extracts may act by suppressing the later phase of the inflammatory process by the inhibition of cyclooxygenase.

Flavonoids possess anti-emetic [36] and anti-inflammatory [37] activity. The ethanol extract of *Luffa cylindrica* peel contain the highest level of total flavonoids [22]. Therefore, it

may be said that flavonoids may play important role in anti-emetic and anti-inflammatory effect of the extract besides other compounds.

CONCLUSION:

Luffa cylindrica is an emerging cash crop that will improve the economies of many nations in the nearest future because of its numerous potentials. Extract of the fruits shows antioxidant activity. Parts of this plants have medicinal properties.

REFERENCE:

- Mazali IO, Alves OL (2005) Morphosynthesis: high fidelity inorganic replica of the fibrous network of loofa sponge (*Luffa cylindrica*). *Ann Acad. Bras. Ciên.* 77(1): 25-31.
- Rowell RM, James SH, Jeffrey SR (2002). Characterization and factors effecting fibre properties, In Frollini E, Leao, AL, Mattoso LHC, (ed.), *Natural polymers and agrofibras based composites*. Embrapa Instrumentacao Agropecuaria, san Carlos, Brazil pp.115-134.
- Newton A (2006). More On How To Grow A Luffa, *Green Living, How To*, www.groovygreen.com/groove/?p=710 (November 28).
- Stirpe F, Barbieri L (1986). *FEBS Lett.* 195:1.
- Kamenosono M, Nishida H Funatsu G (1988). *Agric. Biol. Chem.* 52:1223
- Kishida K, Masuho Y, Hara T (1983). *FEBS Lett.* 153: 209.
- Garcia-Olmedo F, Carbonero P, Hernandez-Lucas C, Paz-Ares J, Ponz F, Vicente O and Sierra JM (1983). Inhibition of eukaryotic cell-free protein synthesis by thionins from wheat endosperm. *Biochim. Biophys. Acta* 52: 740.
- Vitetta ES, Krolick KA, Muneo MI, Cushley W, Uhr JW (1983). *Science* 219: 644.
- Keiichi W, Yuji M, Gunki F (1990). Isolation and Partial Characterization of Three Protein synthesis Inhibitory Proteins from the Seeds of *Luffa cylindrica*, *Agric. Biol. Chem.* 54 (8): 2085-2092. Kishida K, Masuho Y, Hara T (1983). *FEBS Lett.* 153: 209.
- Lee S Yoo JG (2006). (WO/2006/019205) method for preparing transformed luffa cylindrica Roem (World Intellectual property organization) <http://www.wipo.int/pctdb/en/wo.jsp?IA=KR2004002745&DISPLAY=STATUS>.
- Chakravarty, H. L. (1990). Cucurbits of India and their role in the development of vegetable crops. In: Bates DM, Robinson RW and Jeffrey C (Eds), *Biology and utilization of the Cucurbitaceae*, Ithaca, New York, Cornell University Press; p. 325-334.
- Schultes, R. E. (1990). *Biodynamic cucurbits in the New World tropics*. In: Bates DM, Robinson RW and Jeffrey C (Eds), *Biology and utilization of the Cucurbitaceae*, Ithaca, New York, Cornell University Press; p. 307-317.
- Khare, C. P. (2007). *Indian Medicinal Plants: An illustrated dictionary*, New York, NY 10013, USA, Springer Science +Business Media, LLC. 233 Spring Street; 2007, p.384-385.
- Porterfield Jr, W. M. (1955). *Loofah: The Sponge Gourd*. *Economic Botany*, 9, 211-223.
- Perry, L. M. (1980). *Medicinal plants of East and Southeast Asia: Attributed properties and uses*. Cambridge, Massachusetts and London, England: The MIT Press; p.116.
- Prajapati, N. D., Purohit, S. S., Sharma, A. K. & Kumar, T. (2003). *A Handbook of Medicinal plants, A Complete source Book*, India: Agrobios; p.324.
- Schilling, E. E. & Heiser, C. B. Jr. (1981). Flavonoids and the systematics of *Luffa*. *Biochemical Systematics and Ecology*, 9, 263-265.
- Liang, L., Lu, L. E. & Cai, Y. C. (1993). Chemical components from leaves of *Luffa cylindrica*. *Yaoxue Xuebao*, 28, 836-839.
- Naiking Institute of Materia Medica. (1980). A note on the chemical study on the Vines (leaves) of *Luffa cylindrica* (L.) Roem. *Chung Tsao Yao*, 11, 55-64.
- Bor, J. Y., Chen, H. Y. & Yen, G. C. (2006). Evaluation of antioxidant activity and inhibitory effect on nitric oxide production of some

- common vegetables. *Journal of Agricultural and Food Chemistry*, 54, 1680–1686.
21. Partap, S., Kumar, A. S., Neeraj, K. & Jha, K. K. (2012). Luffa Cylindrica: An important medicinal plant. *Journal of Natural Product & Plant Resources*, 2,127-134.
 22. Kao, T. H., Huang, C. W. & Chen, B. H. (2012). Functional components in Luffa cylindrica and their effects on anti-inflammation of macrophage cells. *Food Chemistry*, 135,386–395.
 23. Abirami, M. S., Indhumathy, R., Sashikala, D. G., Satheesh, K. D., Sudarvoli, M. & Nandini, R. (2011). Evaluation of the Wound Healing and Anti-Inflammatory Activity of Whole Plant of Luffa Cylindrica (Linn) in Rats. *Pharmacologyonline*, 3, 281-285
 24. Muthumani, P., Meera, R., Mary, S., Jeenamathew, Devi, P. & Kameswari, B. (2010). Phytochemical Screening and Anti inflammatory, Bronchodilator and Antimicrobial activities of the Seeds of Luffa cylindrica. *Research Journal of Pharmaceutical, Biological & Chemical Sciences*, 1, 11-22.
 25. Khan, K. W., Ahmed, S. W., Ahmed, S. & Hasan, M. M. (2013). Antiemetic and Anti-inflammatory activity of leaves and flower extracts of Luffa cylindrica (L.) Roem. *The Journal of Ethnobiology and Traditional Medicine*. Photon, 118,258-263.
 26. Velmurugan, V., Shiny, G. & Surya, S.P. (2011). Phytochemical and Biological Screening of Luffa cylindrica Linn. Fruit. *International Journal of Pharm Tech Research*, 3(3), 1582-1585
 27. Bowman, W. C. & Rand M. J. (1980). *Textbook of pharmacology*, Oxford, Blackwell Scientific Publication.
 28. Fukui, H., Yamamoto, M., Sasaki, S. & Sato, S. (1993). Involvement of 5-HT3 receptors and vagal afferents in copper sulfate- and cisplatin-induced emesis in monkeys. *European Journal of Pharmacology*, 249, 13-18.
 29. Fukui, H., Yamamoto, M., Sasaki, S. & Sato, S. (1994). Possible involvement of peripheral 5-HT4 receptors in copper sulfate-induced vomiting in dogs. *European Journal of Pharmacology*, 257, 47-52.
 30. Ariumi, H., Saito, R., Nago, S., Hyakusoku, M., Takano, Y. & Kamiya, H-O. (2000). The role of tachykinin NK1 receptors in the area postrema of ferrets in emesis. *Neuroscience Letters*, 286,123-126.
 31. Panthong, A., Kanjanapothi, D., Taesotikul, T., Wongcome, T. & Reutrakul, V. (2003). Anti-inflammatory and antipyretic properties of Clerodendrum petasites S. Moore. *Journal of Ethnopharmacology*, 85, 151-156.
 32. Vinegar, R., Schreiber, W. & Hugo, R. (1969). Biphasic development of carrageenan edema in rats. *Journal of Pharmacology & Experimental Therapeutics*, 166, 96-103.
 33. Crunkhorn, P. & Meacock, S. C. R. (1971). Mediators of the inflammation induced in the rat paw by carrageenan. *British Journal of Pharmacology*, 42, 392-402.
 34. Robinson, D. R. (1997). Regulation of prostaglandin synthesis by antiinflammatory drugs. *Journal of Rheumatology Supplement* 47, 32-39.
 35. Flower, R. J., Moncada, S. & Vane, J. R. (1980). (Eds), *The pharmacological basic of therapeutics*, 6th ed., Macmillan . New York, pp. 701-705. Gilman AG Goodman LS and Gilman A& Co
 36. Kinoshita, K., Kawai, T., Imaizumi, T., Akita, Y., Koyama, K. & Takahashi, K. (1996). Anti emetic principles of Inula linariaefolia flowers and Forsythia suspensa fruits. *Phytomedicine*, 3, 51-58.
 37. Rotelli, A. E., Guardia, T., Juárez, A. O., de la Rocha, N. E. & Pelzer, L. E. (2003). Comparative study of flavonoids in experimental models of inflammation. *Pharmacological Research*, 48, 601–606.