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Lagerstroemia Species: A Current Review

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Abstract: The purpose of this study was to evaluate the past work done on *Lagerstroemia reginae* (Lytharceae). This review summarizes the previous and current literature regarding the *Lagerstroemia reginae* commoly known as banaba which is used for its different biological and chemical potentiality. The plant is a medium-sized to large much branched deciduous tree with elliptic or oblong-lanceolate leaves are acuminate. Flowers are generally large and posses showy to mauve to purple in colour. The parts of the plant posses many activities as A medium-sized to large much branched deciduous tree. Leaves elliptic or oblong-lanceolate, 10-20 cm long, acuminate. Flowers are large, showy to mauve to purple in colour. The parts of the plant posses many activities as leaves posess hypoglycaemic activities, fruits are used as a local application for aphthae of the mouth, seeds are used as narcotic, bark and leaves are used as purgative while roots are considered as astringent, stimulant and febrifuge. The plant posses many pharmaceutical active constituents like leaves and fruits contain ellagitannins, extrcat of leaves contain alanine, isoleucine α-aminobutyric acid and menthionine, They also contain lageracetal, amyl alcohol, ellagic acid, β-sitosterol, a tannin compound as- lagertannin; 3,3´, 4-tri-O-methylellagic acid and 3-O-methyllellagic acid. It posses antidiabetic activity which is due to corosolic acid and ellagitannins. It is also responsible for exhibiting various major activities like antioxidant, anti-inflammatory, antihyperlipidemic, metabolic syndrome activities. Thus this review will emphasis on the other biological activities focusing on its traditional uses which will heal the aliments and cure mankind for a better and healthy living.
Keywords: Corosolic acid, Ellagic acid, Ellagitannins.

Introduction

Lagerstroemia speciosa (Lytharceae) is a shrub to large tree with multiple trunks or stems diverging from just above the ground level. The genus *Lagerstroemia* was first described by Carlos Linnaeus. The name *Lagerstroemia* recognizes Magnus von lagerstroem, a Swedish naturalist who provided specimens from the east for Linnaeus [1] .The common names of *Lagerstroemia speciosa* are giant crape-myrtle, queen's crape-myrtle, banaba plant for Philippines. It is also known as 'pride of India' [2]. Banaba is widely distributed in Philippines, India and Malaysia. The fruits are subglobose capsule type, and they are 2-3.2 cm long. The chemical constituents of *Lagerstroemia speciosa* include ellagitannins and related compounds in leaves and fruits. Extracts of leaves contain alanine, isoleucine alpha amino butyric acid and menthionine, but no alkaloids or glucosides or sterols or flavonoids. Leaves also contain lageracetal, amyl alcohol, ellagic acid, beta sitosterol, new tannin-lager tannin; 3, 3, 4-tri-O-methylellagic acid and 3-O-methyllagic acid.

Diabetes is a group of metabolic diseases in which a person has high blood sugar, either because of the pancreas which does not produce enough insulin, or because of cells which do not respond to the insulin which is produced [3]. The leaves of the *Lagerstroemia speciosa* leaf have great medicinal value, particularly in the treatment of diabetes. The leaves are elliptic or oblong- lanceolate, 10-20 cm long, acuminate. *Lagerstroemia*

speciosa leaves extracts have been used for many years in folk medicine to treat diabetes, which was first published in a research study reported in 1940. Obesity is a leading preventable cause of death world wide, with increasing prevalence in adults and children and authorities view it as one of the most serious public health problems of the 21st century [4]. Banaba extracts possess good antiobesity effect, without any adverse effects [5]. The search for a curative agent against diabetes, obesity etc resulted in the introduction of many therapeutic agents. But the ironic thing is that the various harmful side effects and weak effectiveness of them made their use limited. And the search to find more effective agents continues and one of them is *Lagerstroemia species.*

Hypercholesterolemia

Takagis *et al*, 2010 [6] worked on the effect of corosolic acid on dietary hypercholesterolemia and hepatic steatosis in KK-Ay. They found that Corosolic acid has some direct effect on the cholesterol absorption process in the small intestine.

Antioxidant

Saumya and basha 2011 [7] worked on the antioxidant effect of *Lagerstroemia speciosa* pers (banaba) leaf extract in streptozotocin induced diabetic mice. They found that aqueous banaba leaf extract (150mg/kg body weight) duly reduced STZ generated reactive intermediate and radical species helping to regulate normal levels of antioxidative markers like super oxide dismutase, catalase, glutathione-s-transferase and reduced glutathione.

Antitussive

Mazumder *et al*, 2004 [8] worked on the activity of evolution of antitussive activity of *Lagerstroemia parviflora* leaf extract, when cough induced by sulfur dioxide gas in mice, the *Lagerstroemia parviflora* extract showed maximum inhibition of cough reflex at 90 min after drug administration.

Pharmacognistic study

Takagis *et al*, 2008 [9] worked on the effect of corosolic acid on the hydrolysis of disaccharides. They found that the hypoglycemic activity of corosolic acid is derived, at least in part, due to the inhibition of the hydrolysis of sucrose.

Kim *et al*, 2009 [10] worked on biphenylquinolizidine alkaloids isolated from *Lagerstroemia indicia.* And it was they found that two new biphenylquinolizidine alkaloids, 5-epi-dihydrolyfoline, and its stereoisomer dihydrolyfoline, along with lagerine were isolated from the aerial parts of *Lagerstroemia indicia.*

Woratouch thitikornpong *et al*, 2011 [11] worked on the pharmacognostic evalution of *Lagerstroemia speciosa* leaves. They found that the presence of anomocytic stomata and parenchyma containing rosette aggregate calcium oxalate crystals. Triterpene , sterol and tannin tests were positive.

Caligiani *et al*, 2013 [12] worked on a simple GC-MS method for the screening of betulinic, corosolic, maslinic, oleanolic and urosolic acid contents in commercial botanicals used as food supplement ingredients. They found that only *Lagerstroemia speciosa* was rich in maslinic acid (4958mg/kg).

Anti- inflammatory activity

Yang *et al*, 2011 [13] worked on the anti-inflammatory effect of ethanolic extract from *Lagerstroemia indica* on air way inflammation in mice. They found that increased cytokine concentrations were inhibited by the extract of this plant. And it may be used as a valuable agent for treating allergic disease such as asthma due to its anti-inflammatory property.

Antimicrobial activity

Diab *et al*, 2012 [14] worked on the antimicrobial screening of some Egyptian plants and active flavones from *Lagerstroemia indica* leaves. Around 124 plant extract were evaluated for their antimicrobial activity, they found that only the methanol extract of *Lagerstroemia indica* leaves exhibited antimicrobial activity against all pathogenic bacteria and *C.albicans,* yeast that were tested.

Antidiabetic and hypoglycemic activity.

Murakami *et al,* 1993[15] performed screening of the *Lagerstroemia speciosa* in the ehrlich ascites of the tumour cells. They come to a conclusion that corosolic acid was a glucose transport activator. which generally reduces the blood sugar level.

Judy *et al,* 2003 [16] worked on antidiabetic activity of a standardized extract (glucosol) from *Lagerstroemia speciosa* leaves in type two diabetic. Models, which were dose dependent in nature. They found that glucosol at daily dosages of 32mg and 48mg for two weeks showed a significant reduction in the blood glucose levels.

Tanquilut *et al,* 2009 [17] worked on hypoglycemic effect of *Lagerstroemia speciosa* pers on alloxan – induced diabetic mice. The research studies suggest that *Lagerstroemia speciosa* possesses beneficial antihyperglycemic activity in controlling the elevated glucose levels in alloxan induced diabetic mice.

Saha *et al,* 2009 [18] worked on the hypoglycemic activity of *Lagerstroemia spesiosa* leaves extract on streptozotocin induced diabetic rat, underlying the mechanism of action. They come into the conclusion that the hot water extract of *Lagerstroemia speciosa* leaves attributed its prominent hypoglycemic activity on experimental diabetic rats through suppression of gluconeogenesis and stimulation of glucose oxidation using the pentose phosphate pathway.

Amornnat *et al,* 2009 [19] conducted an experiment in the diabetic rats and they found that the water extract from the leaves of *Lagerstroemia speciosa* can reduce the fasting blood glucose level of streptozotocin-induced diabetic rats.

Niwat and Juntipa 2009 [20] performed an experiment on the upregulation of glucose uptake in L8 myotubes by the extract from *Lagerstroemia speciosa*. The result suggest that *Lagerstroemia speciosa* leaves exhibited an action may mediate primarily via the synthesis of new transporters and involve both insulin-dependent and independent pathways.

Cheolin park and Jae-sik 2011 [21] lee found that *Lagerstroemia speciosa (banaba)* was the natural remedy for diabetic patients. As it plays an important role in regulating blood-sugar and insulin level in the blood. Thus the antidiabetic activity was proven.

Miura T *et al,* 2012 [22] worked on the management of diabetes and its complication with banaba (*Lagerstroemia speciosa*) and the active constituent Corosolic acid. They found that Corosolic acid decreases the blood sugar levels with in 60 min. in human and it also exhibited antihyperlipidemic and antioxidant activity.

Result And Discussion

The family *Lythraceae* consists of about 24 genera and nearly 500 species wide spread in the temperate regions [23]. In India it is represented by 11 genera and about 45 species [24]. This data shows that *Lagerstroemia speciosa* is spread all over the world. And nowadays India has more diabetic cases than any other country in the world, according to the International Diabetes Foundation [25]. Even type-1 and type-2 diabetes were identified as separates condition for the first time by the Indian physicians Sushruta and Charaka in 400-500 CE with type-1, associated with youth and type-2 with being overweight [26]. Metformin is generally recommended as a first line treatment for type-2 diabetes [27], even though the most common adverse effect of metformin is gastrointestinal upset, including diarrhea, cramps, nausea, vomiting and increased flatulence [28]. Diabetic condition with type-2 has become a predominant public health problem with increasing rate of affecting people world wide [29].

Conclusion

Natural remedies are viable alternatives to oral medications that may cause undesirable side effect. Particularly one of the various botanical health care products, *Lagerstroemia species* extracts has been made worldwide for the treatment of particular silent disease. In the past 12 years studies regarding *Lagerstroemia species* extracts were reported. Theses studies indicate that *Lagerstriemia species* extracts contain interesting biomedical substances that have attracted significant scientific attention towards the treatment profile of many diseases. However these health care products have not been evaluated by the US FDA and have little scientific analyses

were carried out for confirm action of which were responsible for the treatment of various aliments the effects mechanism of the plant extract and the active ingredients [30].

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