Vol 7| Issue 1| 2017 | 35-39.

e-ISSN 2248 – 9142
print-ISSN 2248 – 9134

International Journal of
Current Pharmaceutical & Clinical Research

www.ijcpcr.com

MEDICINAL PROPERTIES OF *Gliricidia sepium:* A REVIEW

T.Jasmine[1], R.Meenakshi Sundaram[1], M.Poojitha*[1], G.Swarnalatha[2], J.Padmaja[3], M.Rupesh kumar[4], K.Bhaskar Reddy[5]

[1]Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor-517127, Andhra Pradesh, India.
[2]University College of Science, Osmania University, Hyderabad-500007, Telangana, India.

ABSTRACT

Therapy with medicinal plants is as old as mankind itself. Awareness of medicinal plants usage is a result of many years of struggles next to illnesses due to which man learned to pursue drugs from bark, seeds, fruits, and other parts of the plants. Contemporary science has accredited their active action, and it has included in modern pharmacotherapy a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia. The knowledge of the improvement of ideas related to the usage of medicinal plants as well as the development of awareness helps to increase the ability of pharmacists and physicians to respond to the challenges that have emerged with the spreading of professional services in facilitation of man's life.

Key words: History, Medicinal plants, Emerging medicine, Usage.

INTRODUCTION

In spite of enormous advances of modern scientific medicine, traditional medicine is still the primary form to treat diseases of majority of people in developing countries together with India; even among those to whom western medicine is available, the number of people using one form or another of complementary of alternative medicine is rapidly increasing worldwide.

According to WHO (World Health Organisation) it was estimated that about 80% of population depends on the medicinal plants for their primary health care needs, even though the allopathic medicine is available. These kinds of changes may have deep impact on the safety and efficacy of the naturally originated drugs in the market.

Recent knowledge on the natural therapy which can overcome the side effects of allopathic medicine the current therapy is moving towards the natural therapy. The natural therapy includes treatment with medicinal plants, herbs etc.

At present no drug is proven to be effective without side effects. Major part of population in the country depends on medicinal plants for health care. Research teams in pharmaceutical fields are being focussed on the medicinal plants to separate and elute the principle compound from the plant, which helps for treating the diseases.

The current review focus on the medicinal plant *Gliricidia sepium* with the reported pharmacological activities till dated.

Plant Profile:

Description of plant:

Gliricidia sepium is a small to medium sized, thorn less tree which usually attains a height of 10-12 m [3]. The branching of plant is usually from the base with a basal diameter ranging from 50-70 cm. The bark of the plant is smooth and varies in colour from whitish grey to deep red brown [4]. The stem and branches are commonly flecked with small lenticels [5]. Trees display spreading crowns. Leaves appears in the order of imparipinnate but are usually in alternate order, leaflets ranges around 30 cm

Corresponding Author :- **M.Poojitha** Email:- poojithamallapu91@gmail.com

long. Leaflet midrib and rachis are occasionally striped red. Inflorescence of the plant looks as clustered racemes; flowers are borne piecemeal with 20-40 per each raceme [6]. Flowers appear from bright pink to lilac shades, while some appear as tinged with white. Standard petal round and nearly erect, approximately 20 mm long, keel petals 15-20 mm long, 4-7 mm wide [7].Fruits appears in green or tinged reddish purple occasionally at unripe condition, whereas in ripen condition they appear in light yellow brown and looks like round in shape [8].

Pharmacological activities reported till dated:

Larvicidal activity:

The larvicidal activity of *Gliricidia sepium* leaves against the fourth in star larvae of Anopheles mosquitoes was demonstrated by the pet.ether extract. The study was targeted on the larvae of Anopheles mosquitoes only but the relative effect of plant material was also found on non-targeted organisms like tadpole and guppy fry (*Poecilia reticulata*). The leaves of the plant were extracted with the solvent pet. ether(80%) and the Samples of larvae were transferred into the extract at the various concentrations (0, 25, 50, 100, 150, 200, and 250 ppm). The mortality was observed and the dead larvae were counted after 15 min, 30 min, 1 hr, 3 hrs, 4hrs, 5hrs and 6 hrs. As per the results discussed in the article it was found that there was a gradual increase in the lethal effect of *Gliricidia sepium* leaves on the Anopheles larvae with respect to both concentration as well as time. Lethality was observed from 1 hr, at a concentration of 200 ppm and by the 6^{th} hour, all the concentrations were lethal. As per the results it was demonstrated that the calculated LC50 (larvae) was 70.68 ppm/6 hrs. So it was determined that there are no lethal effects on non-targeted organisms and also states that *Gliricidia sepium* leaf extract has shown potent effect on controlling mosquito larvae [9].

Antimicrobial activity:

The antimicrobial activity of *Gliricidia sepium* (Leaf ethanol 1extract) was reported by *invitro* by well diffusion method against clinical isolates of *E,coli, S. aureus, Pseudomones, S. typhi, Klibsella sp*. The microbial growth inhibition by ethanol extract of the plant was particularly active against *E.coli*. As per the reported results of the antibacterial activity of plant extract can show as 1.5cm, 1.3cm, 1.2cm, 1.1cm, and 1.0cm of zone of inhibition on plate assay. The highest activity was noted against E.coli bacteria. Ethanolic leaf extract of *G. sepium* was tested for its nematicidal property at different concentrations against *Meloidogyne incodnita* nematodes. It had observed that G/2 dilution was highly significant showing 60% mortality against control and G/3, G/4. Although 97% mortality in G/1 dilution, but may be this concentration toxic for plant would be effected on growth yield. Repellent activity of *G, sepium* (Ethanolic extract) had studied by testing it against adult Mosquito *Aedes aegypti (L.).* Their results were compared with the citronella oil. The maximum repellence percentage afforded by the repellent *G. sepium* was 78% whereas with citronella oil, the repellence percentage was 74% [10].

Antibacterial activity:

The anti-bacterial activity of *Gliricidia sepium* and *Spathodea campanulata* leaf was reported for the crude and fractions were carried out against nine clinical bacteria isolates using the agar well and disc diffusion methods respectively. *S. Campanulata* crude and fractions extract possessed higher inhibitory potencies than *G. Sepium* extracts. The antioxidant activities of DPPH test has expressed better in *S. Campanulata* than *G. Sepium.* Finally it was demonstrated that the *G.sepium* extract has the highest concentration of phenol with a value of 1.7mg/ml and flavonoid content with a value of 0.4mg/ml. The ethanolic extracts of *Gliricidia sepium* and *Spathodea campanulata* leaves has been reported for more potent inhibiting activity, which is followed by the methanolic and pet. Ether extracts has shown the least activity. *G.sepium* fractionate extract has shown the potent inhibitory activity on microorganisms between 0-48.7mm while *S. Campanulata* inhibited the organisms with halos between 0-49.3mm [11].

The antibacterial activity of thee flowers of *Gliricidia sepium* were found to contain the flavonol glycoside, isoquercitrin. The polyphenolic compound that was isolated has been ascertained by means of UV, H-1 NMR, C-13 NMR, chemical reactions, chromatographic examinations and hydrolytic studies. The isolated yellow pigment is observed to be antibacterial. This property has been compared with standard drugs [12].

A study on the *Gliricidia sepium* literally meaning "Rat poison" is a multipurpose tree with source one of herbal medicine in primary health care sector. A comparative antibacterial activity of dried leaf extracts of *G.sepium* (L) were evaluated against two gram negative bacterial strains namely *Escherichia coli* and *Pseudomonas aeruginosa* by agar cup method. Their study revealed the results of extraction yield, total phenol and flavonoid compounds and bioactivity tests varied depending upon the type of solvent being used. The *G.sepium* leaf contains a considerable quantity of phenols and flavonoid compounds which acts as a major contributor for the antioxidant and antibacterial activities. Hence it was concluded that the leaves of *G.sepium* helps to establish the interest to invent more new and potent anti microbial drugs of natural sources [13].

Anti-inflammatory activity:

An anti-inflammatory activity was reported on the aqueous extract of *Gliricidia sepium linn* flowers by using in vitro Human Red Blood Cell membrane stabilization assay and *invivo* methods like carrageenan induced paw oedema model. Aqueous extract showed dose dependent

anti-inflammatory activity in human red blood cell membrane stabilization method at different concentration (100-500 µg/kg) with a percentage protection of 7.15, 11.25, 22.71, 24.83 and 26.95 compared to standard diclofenac 32.09% at 10µg/kg. Diclofenac sodium at 10 mg/kg, aqueous extract administered at a dose of 250 and 500 mg/kg p.o.at 1, 3, 6 and 8 hours significantly ($p<0.05$) decreased and increased the volume of paw edema & % protection compared to carrageenan group and diclofenac, respectively. According to the reported results from the study it shows a significant ($p<0.05$, $p<0.01$, $p<0.001$) percentage inhibition of paw edema. At the end of the study it was reported that the flowers of *Gliricidia sepium* can be used as an anti-inflammatory agent [14].

Leaf and flower oil composition of *Gliricidia sepium*:

Gliricidia is a small genus of flowering plant belongs to the family *Fabaceae*. *Gliricidia sepium* is a multipurpose tree to Mesoamerica and possibly northern South America. The chemical composition of the hydro distilled essential oils of *G. sepium*, growing wild in the Central Pacific coast of Costa Rica, were analyzed by capillary gas chromatography-flame ionization detector (GC-FID) and capillary gas chromatography-mass spectrometry(GC-MS) using the retention indices on DB-5 type capillary column. A total of 96 and 109 compounds were identified in the leaf and flower oils, corresponding to 87.9% and 89.2% of the total amount of the oils. The oil extracted from the leaves has shown the presence of terpinoids(28.1%) and aliphatics(54.9%) along with the other components like linolinate (6.0%), pentadecanal(18.7%), methyl and nonanal (5.1%) as minor components where ass the major components like hexadecanoic acid (19.7%), (E)-nerolidol (5.9%), myrtenol (7.7%) [15].

Inhibitory activity of *G.sepium* due to coumarin:

The inhibitory activity of *Gliricidia sepium* (Fabaceae) leaves was reported by the activity of methanol extract showed the inhibition of growth of lettuce (Lactuca sativa) radicles the extract was fractioned based on the total activity on lettuce radical elongation. The fractionate extract of n-hexane obtained by liquid-liquid partitioning of methanol extract showed strong inhibitory activity. A compound corresponding to the major peak in high performance liquid chromatography was isolated from the fraction and identified as coumarin content (11.6 mmol kg-1 fresh weight) and the total activity of coumarin (500) in *G. Sepium*, they concluded that the inhibitory activity of *G.sepium* was primarily due to coumarin [16].

Leaf decomposition of *Gliricidia sepium*:

The investigation on the leaf decomposition of *Gliricidia sepium* was reported for its value added property in humid lands. They brought a conclusion by using a litter bag study (24 weeks) *Gliricidia sepium* leaves under sweet potato (*Ipomoea batatas*). Decomposition rates of piper leaf litter by gliricidia, and lost 50% of the leaf biomass within 10 weeks. Gliricidia leaf litter released about 79 kg N ha1. The mineralization of three species released a large amount of K. Gliricidia leaf litter contained much N, where imperata leaf litter releases relatively little nutrients and keeps the soil more moist. Finally it is reported that the Gliricidia is more attractive than any other species of plants in comparision [17].

Gliricidia as nitrogen supplement to Napier grass basal diet:

They evaluated the effects of supplementing Napier grass variety Bana (Pennisetum purpureum) with Clitoria ternatea (Clitoria), *Gliricidia sepium* (Gliricidia) and Mucuna pruriens (Mucuna) on feed intake, diet digestibility and milk yield of lactating Jersey cows. Clitoria and Mucuna were compared with Gliricidia; a widely studied nitrogen supplement to roughage-based diets in coastal Kenya. Four groups of lactating jersey cows were used for t he study which revealed that the concentration of tannin is high in Gliricidia compared to the other legumes. They were however below the critical level of 6% hence were not expected to have any negative effect on animal performance. The total dry matter intake was not affected by legume supplementation (P NO.05). Legume supplementation had no significant effect on organic and dry matter digestibilities (P NO.05). Nitrogen supplementation (P B0.05) increased daily milk yield by 20%, 27.5% and 32.5% for cows fed Gliricidia, Clitoria and Mucuna respectively. Results from this study showed that Mucuna and Clitoria can give similar lactation performance to Gliricidia as nitrogen supplements Napier grass basal diet [18].

Additional Flavanoids in *Gliricidia sepium*:

The chromatographic examination of the acetone extractives of the moderately marine bore resistant Panamanian wood *Gliricidia sepium* had resulted on the isolation and characterization of three new flavanoid constituents: an isoflavone a di hydro flavonol and a b-hydroxy di hydrochalcone. These new flavanoids are related to the marine bore resistance of the wood [19].

Extracts of Gliricidia sepium to control pests on maize (Zea mays L.):

Extracts of plants have been used to control pests, but little information exists about how effective they are to limit crop damage, or how they affect plant growth, crop yield and insects. Extracts from *Azadirachta indicia*. Jus. (L.) Untreated maize plants served as control (CONTROL treatment). Climatically occurred changes were also observed for the years 2003-2006 during which any damage to crop growth and Plant damage can occur. The amount of beneficial insects was not affected by treatment, while the amount of insects that cause damage was significantly

lower (ca. 2-fold) in the CHEMICAL treatment than in the other treatments. Mean damage to the newly formed leaves was 18% in the NEEM treatment and 23% in the GLIRICIDIA treatment and significantly lower than that of the CONTROL treatment (37%), but significantly higher than that of the CHEMICAL treatment (11%). It was found that leaf extracts of *G. Sepium* and *Azadirachta indicia* has shown the reduced damage to the newly formed leaves and increased yields compared to untreated maize plants, with neem being more effective [20].

Fig. 1. Leaves of *Gliricidia sepium*

CONCLUSION

From the current review we can conclude that the pharmacological studies with plant sources can result in novel and effective pattern of treatment. The article intend to provide an overview of the phytochemical constituents present in *G.sepium* (L) with special emphasis on their pharmacological actions like It was used as mosquito repellent, fumigants, treatment of dysentery, wound-dressing, antibacterial, antifungal, antiviral agent. By using Entire parts of plant like flowers, roots, leaves etc. which have ethno medicinal properties. Based upon the presence of flavonoids reported many pharmacological activities like antiulcer, anti-oxidant and other pharmacological activities can be carried out. Hence, pharmacologists need to take more active interest in evaluation of herbal drugs for potential therapeutic effects and standardization of such herbal drugs to be clinically effective and globally competitive.

REFERENCES

1. Rakesh Pahwa, Neeta, Vipin Kumar, Kanchan Kohli. Clinical Manifestations, Causes and Management Strategies of Peptic Ulcer Disease. *International Journal of Pharmaceutical Sciences and Drug Research*, 2(2), 2010, 99-106.
2. Shirisha Bongul, Subash Vijaykumar. Animal Models in Experimental Gastric Ulcer Screening-A Review. International Journal of Pharmacological Screening Methods, 2(2), 2012, 82-87.
3. Rani Batish, Daizy, Ravinder Kumar Kohli, Shibu Jose, Harminder Pal Singh. Ecological Basis of Agro forestry. CRC Press, Taylor& Francis Group, 2008, 44.
4. Hughes, C.E. Biological considerations in designing a seed collection strategy for *Gliricidia sepium*. Common Wealth Forestry Review, 66, 1987, 31-48.
5. *Gliricidia sepium*, Treating Livestock with Medicinal Plants: Beneficial or Toxic? Cornell University, EOL newsletter, 2008, http://eol.org/pages/642632/details.
6. *Gliricidia sepium*. Tropical Forages. Australian Centre for International Agricultural Research, EOL Newsletter, 2012, http://eol.org/pages/642632/hierarchy_entries/46211466/details
7. Stuttle, J.M. *Gliricidia sepium* (Jacq). Food and Agriculture Organization of the United Nations. Retrieved 29 November 2015.
8. Lowe, Andrew; Stephen Harris; Paul Ashton. Ecological Genetics: Design, Analysis and Application. Blackwell Publishing England, 1922,154.
9. Jiby John Mathew, Prem Jose Vazhacharickal, Sajeshkumar N.K and Jesmi Sunil. Larvicidal acitivity of *Gliricidia sepium* leaf extracts on Mosquito larvae and its lethal effect on Nontargeted Organisms. CIBTech Journal of Biotechnology, 4(2), 2015, 13-19.
10. Rahila Nazli, Mussarat Akhter, Shagufta Ambreen, Abdul Hameed Solangi, Nighat Sultana. Insecticidal, Nematicidal and Antibacterial Activities of *Gliricidia sepium*. pak. J. Bot, 40(6), 2008, 2625-2629.
11. *F.C. Akharaiyi, B.Boboye and F.C Adetuyi*. Antibacterial, Phytochemical and Antioxidant Activities of the Leaf Extracts of *Gliricidia sepium and Spathodea campanulata*. World Applied Sciences Journal, 16(4), 2012, 523-530.
12. D.Sukumar C. Aparna. phytochemical Studies and Antibacterial Investigations on *Gliricidia sepium*. Indian journal of research, 3(1), 2014, 12-13.
13. Neethu S Kumar, Neethu simon. *In vitro* antibacterial activity and phytochemical analysis of *Gliricidia sepium* (L.) Leaf extracts. Journal of pharmacognosy and phytochemistry, 5(2), 2016, 131-133.

14. Kola Phani Kumar, Vadite Siva Naik, V.Bhuvan Chandra, R. Lavanya, K. Narendra Kumar, V.Bhagyasree, B.Soumya, Lakshmi Sudeepthi N. Evaluation of In Vitro and In Vivo Anti-inflammatory Activity of Aqueous Extract of *Gliricidia sepium* Flowers in Rats. International Journal of Pharmacognosy and Phytochemical Research, 2014: 6(3): 477-481.
15. Carlos Chaverri, Jose F. Ciccio. Leaf and flower essential oil compositions of *Gliricidia sepium* (Fabaceae) from costa Rica. American Journal of Essential Oils and Natural products, 2 (3), 2015, 18-23.
16. T Takemura, T Kamo, E Sakuno, S Hiradate & Y Fujii, "Discovery Of Coumarin As The Predominant Allelo chemical in *Gliricidia sepium. Journal Forest of Tropical science*, 25(2), 2013:268-272.
17. Alfred E. Hartemink & J.N. O'Sullivan.Leaf litter decomposition of piper *aduncum*, *Gliricidia sepium* and *Imperata cylindrica* in the humid lowlands of papua New Guinea. Plant and Soil, 230, 2001, 115-124,
18. H.K. Juma, S.A. Abdulrazak, R.W. Muinga, M.K. Ambula. Evaluation of Clitoria, Gliricidia and Mucuna as nitrogen supplements to Napier grass basal diet in relation to the performance of lactating Jersey cows. *Livestock science*, 103,2006, 23-29.
19. Gary D. Manners and L eonard Jurd. Additional Flavanoids in *Gliricidia sepium*, Phytochemistry, 18, 1979, 1037-1042.
20. J.A. Montes-Molinaa, M.L. Luna-Guidoa, N. Espinoza-pazb, B. Govaertsc, F.A. Gutierrez-Micelid, L. Dendoovena. Are extracts of neem (Azadiirachta indica A. Juss. (L.)) and *Gliricidia sepium* (Jacquin) an alternative to control pests on maize (Zea mays L.). Crop protection, 27, 2008, 763-774.
21. J.O. Ondieka , S.A. Abdulrazakc, J.K. Tuitoeka, F.B. Bareebab. The *Gliricidia sepium* and maize bran as supplementary feed to Rhodes grass hay on intake, digestion and live weight of dairy goats. Livestock Production science, 61, 1999, 65-70.